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A REASEARCH PAPER
On

Survey on Cloud Computing And Comprehensive Study on Cloud Services

Master of Computer Application

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By

Student Name

Om kar (2101920140104),
Ankit Singh Negi(2101920140029),
Himanshu Singh Negi(2101920140071)

Under the supervision Of

Ms. Anju Mishra

Abstract :-

Cloud Computing has become an increasingly popular and important area of research in recent years. In this survey paper, we aim to provide and a comprehensive overview of the state of the art cloud computing. We begin by discussing the fundamental concepts and principles of cloud computing, including the key characteristics and benefits that make it such a compelling technology. We then review the various types of cloud services that are available, including Infrastructure as a Service, Platform as a Service and Software as a Service.

Next, we explore the various challenges and opportunities associated with cloud computing, including security, privacy, and compliance issues, as well as the potential for cost savings and including efficiency.

Finally, we conclude with a discussion of future directions for research in cloud computing, including the potential for further advances in areas such as machine learning, edges computing, and quantum computing. Overall this provides a comprehensive overview of the current state of the art in cloud computing.

Introduction :-

In the simplest turn cloud computing means storing and accessing data and program over the internet instead of your computer hardware drive. The cloud is just metaphor for the internet. It goes back to the days of flowchart and presentations that would represent the gigantic server-farm infrastructure of the internet as nothing but a puffy.

Cloud computing distribution computing services such as services, data storage and resource manage by its self rather than end user. Cloud resource can be access without human interaction, any person can access the cloud serves with the help of sign-up account. Organization can also allow to access some module for your employ and partner.

Now a days cloud computing is the most exceptional solution provide for those how looking for easily implementation techniques. Cloud computing provide a parallel distribution, virtual and flexible system such as software and hardware with the help of internet. cloud computing work on 'Pay Asa You Go (PAYG)' model. PAYG allow the user to scale and customize the services, resource, storage and platforms.

Public cloud is applying the PAYG model differently for different kind of services. for exp you have only use Software as a Service (SaaS) you pay only for software service

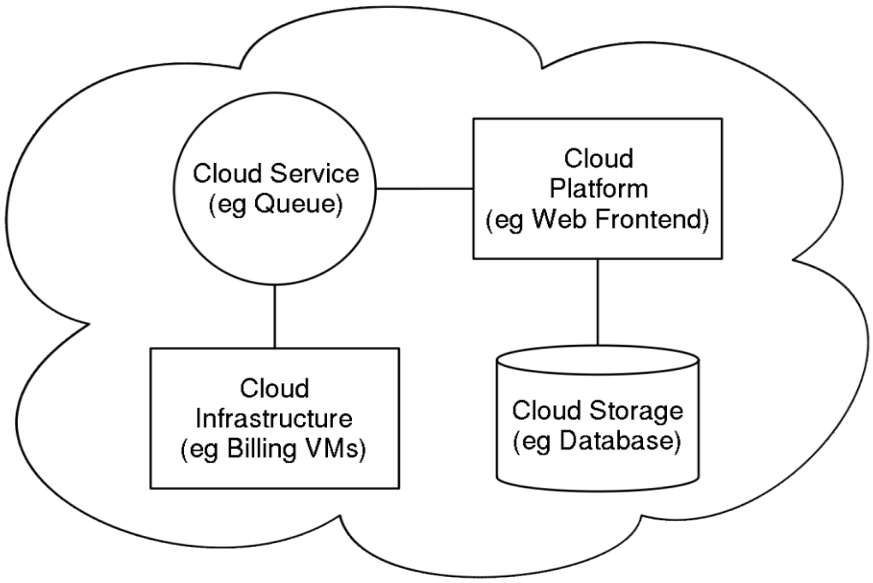

Figure 1: cloud computing architecture

Cloud Computing :-

1. Concepts of cloud computing: -Cloud computing shares characteristics with:

1.1. Client-server model: -It make more sense in any kind of distribution that separate service provider (server) and candidates(clients).

1.2. Computer bureau: -the computer service center mainly provides computer services from the 1960s to the 1980s.

1.3. Grid computing: -A super computer made of connected computer distributed and related computer and loosely compiled computers, perform a concert to perform great work.

1.4. Fog computing:-A distributed camped model that provides data, compute, storage, and application services to user-friendly cardiac devices such as client or network routers. In addition, instead of sending data to a remote location for processing, a computer-based company handles network-level data on smart devices and on the client side (egg, mobile devices).

1.5. Mainframe computer:-Large companies mainly use powerful computers for sensitive applications, often for processing data at such scales; Industry and consumer statistics; Police and privacy services; Business service planning; Financial performance.

1.6. Utility computing:-"Packaging materials such as packaging, storage, traditional community service release and electricity.

1.7. Peer-to-peer:-Partnership structure without the need for intermediate communication. Participants are suppliers and service customers (unlike the traditional customer server model).

1.8. computing Cloud: real-time, unique computer environment that can run without affecting the operating system on which the program, code or file is running.

2. Characteristics of Cloud Computing:-

There are basically five essential characteristics of Cloud Computing.

2.1. On-demand self-services: -Cloud computing services do not require human administrators, users can provide, monitor and manage computer resources on demand.

2.2. Broad network access: -Computer services often provide common networks and key devices.

2.3. Rapid elasticity: -Computer services need to have IT resources to scale quickly and adequately. Whenever a customer wants the services they offer, they can quickly identify when their needs are being met.

2.4. Resource pooling: -Existing IT resources (egg, networks, servers, storage, operating systems and services) can be shared and unauthorized across multiple applications. Serving multiple clients from a single client.

2.5. Measured service: -The use of the services that follow each program and location gives the user and service provider an account of usage. This is due to various factors such as billing monitoring and the efficient use of resources.

3. Cloud Service Models:

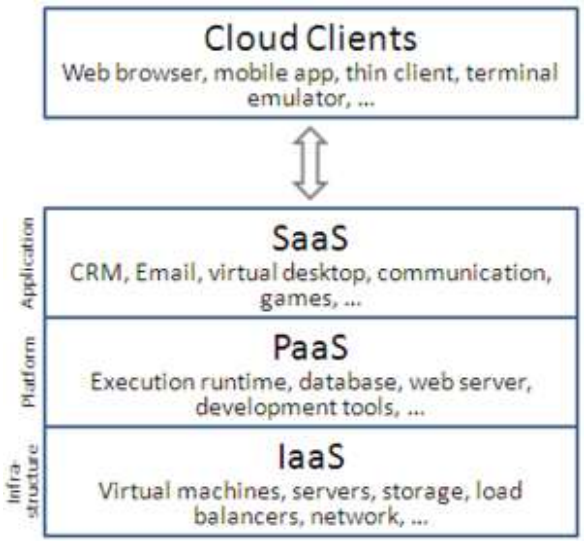

Figure 2: cloud computing service models

The service provider gives the cloud user more or less control over their cloud, depending on the user's usage space and the resources associated with the cloud. For example: Whether it is for business use or domestic use, cloud demand can be varied. There are three types of cloud that it offers: Software as a Service (SaaS), Infrastructure as a Service (IAS) and Platform Application (Pass). But in this paper, we discuss on different type of cloud services.

3.1 Software as a Service (SaaS): -

A software program this is deployed over the Internet is considered as Software as a Service (SaaS). In SaaS, a company licenses a utility to clients both as a carrier on demand, via a subscription, charged as consistent with their usage, or at no rate whilst there's a risk to make profits from streams aside from the person, including from commercial or person list sales. This minimizes the aid and upkeep

cost effectively. Recent reviews display that SaaS will quickly become not unusual place in each enterprise and its miles critical that buyers and customers of era recognize what SaaS is and in which it is suitable. Some defining traits of SaaS include

3.1.1. Software introduced in a "one to many" model
3.1.2. Users now no longer required to address software program enhancements and
3.1.3. Web get entry to to business software program
3.1.4. Software is controlled from a relevant location
3.1.5. APIs permit integration among portions of software program

3.2Platform as a service (PaaS): - A computing platform that permit the designing of net packages quick and without problems without the complexity of shopping for and keeping the software program and infrastructure is described as Platform as a Service. PaaS is akin to SaaS besides that, as opposed to being software program added over the net, it's miles a platform for the advent of software program, added over the net. Here the provider furnished with the aid of using the company consists of simple requirements of improvement and the way you can distribute them effectively. Here the surroundings would include an OS, a database, surroundings where programming language may be carried out and an internet server. This allows the developer to design, check and enforce their own software program at the identical platform that their end-person clients function to run the application. The Google App Engine and the Microsoft Azure is a superb instance of this provider model. Some simple traits of PaaS include

3.1.6. Built in scalability of deployed software program inclusive of load balancing and failover
3.1.7. Web primarily based totally person interface advent equipment assist to create, modify, check and installation distinctive UI scenarios
3.1.8. Integration with net offerings and databases via not unusual place requirements
3.1.9. Support for improvement group collaboration

3.3Infrastructure as a Service (IaaS): - Infrastructure as a Service (IaaS) is a manner of distributing Cloud computing infrastructure – servers, storage, network and running systems – as an on-call for carrier. Instead of shopping for servers, software, data centre area or network equipment, customers rather purchase the ones sources as a fully outsourced carrier on call for [23]. Internet Engineering Task –Force (IETF) has described the IaaS version to be the most primary carrier version. This version is associated with a digital engine [24] and customers can get entry to to infrastructures with digital machine [25]. The line among PaaS and IaaS is Infrastructure as a Service (IaaS) is a manner of distributing Cloud computing infrastructure – servers, storage, network and running systems – as an on-call for carrier. Instead of shopping for servers, software, data canter area or network equipment, customers rather purchase the ones sources as a fully outsourced carrier on call for [23]. Internet Engineering Task –Force (IETF) has described the IaaS version to be the most primary carrier version. This version is associated with a digital engine [24] and customers can get entry to to infrastructures with digital machine [25].

3.4 Robot as a service (RaaS):- The robot is an application that uses services from a remote back-end computer. This all-in-one design gives the robot unit much more power and capacity, so that it can qualify as a fully self-contained cloud unit in the

cloud computing environment. Another key contribution reported in the paper is the development of the services that translates the Microsoft Robotics Studio‟s VPL (Visual Programming Language) program into executable's on Intel platform. These services allow the standard VPL programs to be developed on the Intel-based robot unit. Performance of the RaaS unit on different Intel processors are evaluated, including the evaluation on the new embedded Atom processor.
A robot is a mechanical or virtual artificial agent. It is usually a system, which, by its appearance or movements, conveys a sense that it has intent or agency of its own [21]. Let us consider the basic requirements of robot as a service in the cloud computing environment. There can be many kinds of robot cloud units or autonomous devices. For example, robot cops [22], restaurant robot waiters [23], robot pets [24], and patient care robots [25]. These robots are distributed in different locations and can be accessed through internet. The basic requirement we consider here is that the RaaS should have complete functions of SOA, that is, as service provider, as a service broker, and as a service client.

3.5 Mobile Backend as a service (MBaaS):-

Mobile backend as a service (MBaaS) is an online service designed to be an all-in-one solution for backend app development. This typically includes data and database management, API management, security, and push notifications.

In general, the purpose of an MBaaS platform is to provide app developers with a means to connect their frontend application with backend core features such as cloud computing, cloud storage, and APIs exposed by a backend application. The intended outcome is that it frees app developers from thinking about, worrying about, managing, or performing any tasks related to servers. An MBaaS platform will typically provide a number of basic operations, such as user management, support for push notifications, and social network APIs for social login, posting, etc.

MBaaS services utilize custom software development kits (SDKs) to enable developers to connect their API endpoints to various frontend clients such as iOS and Android applications built with any technology capable of producing a mobile app, such as ReactNative, Ionic, Flutter, Unity, etc. These SDKs can also contain access to the provider's pre-built APIs, such as APIs for login, push notifications, and data service

3.6 Big data as a service(BDaaS):-

BDaaS gives a cloud primarily based totally shape that gives endto-cease huge statistics answers to companies. It is a combined shape of Hadoop as a Service (HDaaS), Data-as-a-Service (DaaS) and Data Analytics as a Service (DAaaS). The widespread boom of statistics is one of the key drivers prevailing on this space. The worldwide Big-Data-as-a-Service (BDaaS) marketplace is probably to develop from $1.eight billion in 2015 to $7 billion with the aid of using 2020, at a CAGR of 31.5 % throughout the forecast period. On the idea of form of answers, BDaaS to follow submarkets:

3.1.10. Hadoop-as-a-Service (HaaS/HDaaS)
3.1.11. Data-as-a-Service (DaaS)
3.1.12. Data Analytics-as-a-Service (DAaaS)

3.7 Data governance services:

Data governance services in the cloud are designed to help organizations manage and control access to their data in the cloud. These services provide a range of features and functionality to ensure that data is used appropriately and securely, including data classification, data mapping, data lineage, and data lineage.

Data classification is the process of categorizing data according to its sensitivity, value, and importance. This can help organizations identify which data requires additional security measures and ensure that it is only accessed by authorized users.

Data mapping is the process of creating a visual representation of the relationships between different data elements. This can help organizations understand how data is used and shared within their organization, and identify any potential vulnerabilities or risks.

Data lineage is the process of tracking the movement of data from its origin to its destination. This can help organizations understand how data is being used and ensure that it is being handled appropriately.

Overall, data governance services in the cloud are an essential tool for organizations looking to ensure the security and compliance of their data in the cloud. These services can help organizations protect sensitive data, reduce the risk of data breaches, and meet regulatory requirements.

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3.8 Data as a service (DaaS):-

As SaaS keeps to triumph the era international with modern merchandise and modern software program platforms, DaaS, its same dual brother, facilitates infuse best records into commercial enterprise and advertising campaigns. Technology primarily based totally DaaS answers offer actual time marketplace records and customer data. Without thinking about the platform or region DaaS separate records from its associated programs to convey meaningful records to users. DaaS brings collectively the technologies vital to retrieve records from heterogeneous reasserts such as transactional databases, records warehouses, organisation resource planning (ERP) systems, and client relationship management (CRM) answers. The DaaS technique delivers the subsequent benefits:

3.1.13. Ability to transport records effortlessly from one platform to another
3.1.14. Preservation of records integrity via way of means of imposing access manipulate measures
3.1.15. Ease of management and collaboration
3.1.16. Compatibility amongst numerous platforms
3.1.17. Global accessibility

3.9 Database as a service (DBaaS):-

Database-as-a-carrier (DBaaS) is a cloud computing carrier version that gives customers with a few shape of get entry to to a database without the want for putting in bodily hardware, putting in software program or

configuring for performance. In DBaas, clients are charged primarily based totally at the used features; capacities used and use of database management tools. Database supervisor module of DBaas controls all underlying database times through an Application Program Interface (API). This API is to be had to the consumer with the aid of using control console – Web application, which the consumer might also additionally use to control and configure the database or even provision or de-provision database times. Markets and Markets forecast the cloud database and DBaaS marketplace to upward thrust from $1.07 billion in 2014 to $14.05 billion with the aid of using 2019, at a Compound Annual Growth Rate (CAGR) of 67.30% withinside the projected duration of 2014-2019 [28]. With the DBaaS marketplace projected to reach $1.eight billion with the aid of using 2016 [29], the want for an agile facts tier withinside the cloud has end up paramount.

3.10 Testing as a service(TaaS):-

The clients are exposed to protection attacks, as they access the Internet via as a substitute unsecured highways. This is wherein SECaaS comes in; serving as a buffer closer to the most unrelenting on line threats [33]. SECaaS is based mostly on the Software as a Service (SaaS) model but restricted to precise information protection services. This is an outsourcing model for protection manage. SECaaS consists of applications which includes anti-virus software program application delivered over the Internet but the term can also consult with protection manage furnished in-house with the resource of the usage of an outdoor organization. The purpose of SECaaS is to offer protection for the information systems while nonetheless allowing the fulfillment of agency purpose and preserving the integrity, availability and confidentiality of the information resources. Security-as-a-Service offers a extensive style of advantages, which include:

3.1.18. Regular updates of virus definitions which is probably not relying on individual compliance
3.1.19. Faster individual provisioning
3.1.20. Greater protection know-how than is typically available interior an organization
3.1.21. Outsourcing of administrative tasks, which includes log manage
3.1.22. Using a cloud-based absolutely protection product moreover bypasses the need for pricey protection experts and analysts Security as a Service product vendors include Cisco, McAfee, Panda Software, Symantec, Trend Micro and VeriSign. In the imminent next four years cloud-based absolutely SECaaS implementation is expected to growth appreciably and in all likelihood to double in boom with the resource of the usage of 2017 [34]. Gartner is forecasting the cloud-based absolutely protection services market, which includes solid email or net gateways, Identity and Access Management (IAM), some distance flung vulnerability assessment, protection information and event manage to raise to $four.13 billion with the resource of the usage of 2017 [35].

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