CHARACTERISTICS OF CLOUD COMPUTING

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Abstract:

Cloud computing is a term that describes the means of delivering any and all IT from computer application, software, business processes, messaging, and collaboration to end users as a service wherever and whenever they need it. The cloud refers to a group of hardware computing devices, software, storage devices, and application programming interfaces (APIs) that integrate and interface with each other to deliver the characteristics of cloud computing in a service model. Shared resources, software, and information are provided to computers and other devices on demand. It allows people to do things they want to do on a computer without the need to buy and build an IT infrastructure or to understand the underlying technology. Cloud computing is a new paradigm for delivering IT where rapid provisioning is an important characteristic for computing resources, data, applications, and IT. This is offered as the highly standardized offering to the consumers over the web portal via the internet. 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. Cloud computing uses commodity-based hardware as its base. The hardware can be replaced any time without affecting the cloud. **The present paper is an honest attempt to attract the attention of the readers and lovers of Computer Sciences towards the importance and characteristics of cloud computing.**

Kew-words: Cloud computing, resource pool, computer application, software, business processes, messaging.

Introduction:

Cloud computing uses a commodity-based software container system. For example, an instance or service can be migrated from one provider to other service provider with zero impact. Cloud computing also requires a virtualization engine and an abstraction layer for the hardware, software, and configuration of systems. Cloud computing also has the multi-tenant feature where multiple customers share the underlying infrastructure resources without compromising the privacy and security of their data. Clouds implement the 'pay-as-you-go' pattern with no lock-in and no up-front commitment and are elastic as the service delivery infrastructure expands and contracts automatically on the basis of the capacity needed. Cloud migration is the next hurdle in cloud computing. This requires the property of powerful interoperability of platforms that should identify the appropriate application that can be migrated to the cloud. It is important to identify the interdependencies and integration points with standards and interfaces that are lacking today among service providers.

Cloud migration becomes more complex if the service bundles are integrated from multiple cloud service providers. This can also become the deal breaker or the reason for downgraded performance. There can also be the

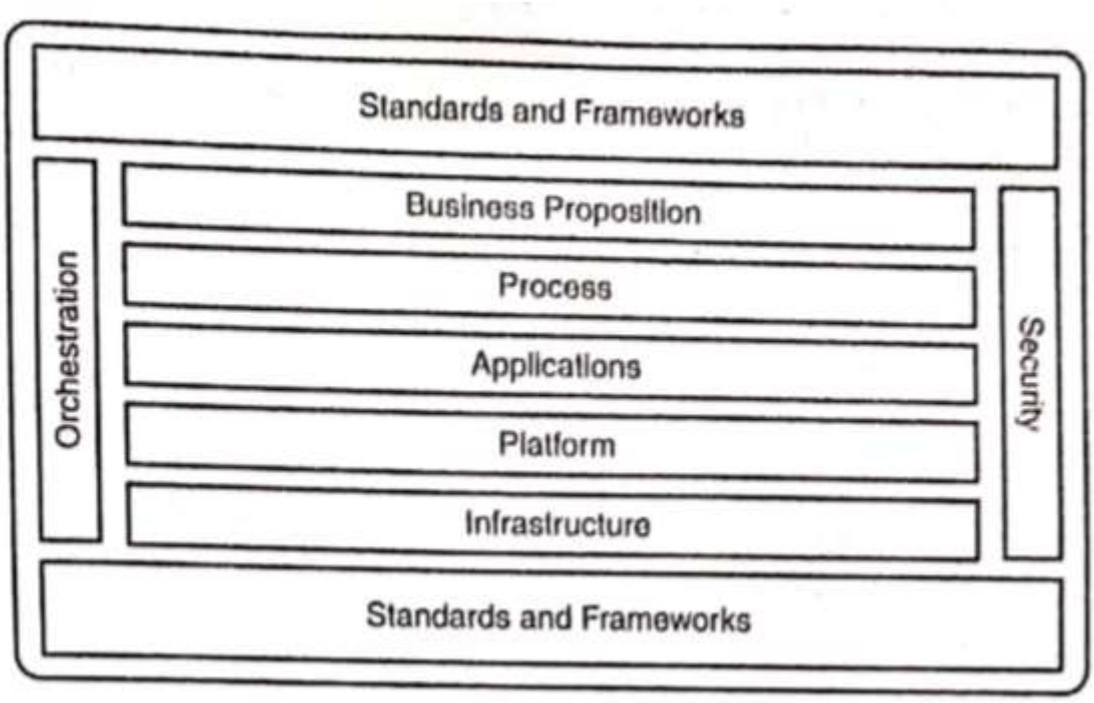
licensing problem in the cloud environment. Also, there are issues related to multi-geography-based application platforms deployment and implementations in the cloud-based model and get some hits with respect to the desired levels of service for multiple offerings. Last hurdle is the workload suitability for cloud. It is also a big question whether the workload is seasonal for the cloud deployment or not. Not all the applications are suitable candidates for the cloud. It depends on the function of the business, enterprise policies, application architecture, scalability, usage patterns according to pay-per-use-model, or infrastructure requirements in the service model.

Objectives:

The main objective of the present paper is to attract the attention of the readers towards the importance and characteristics of cloud computing.

Why Cloud?

The cloud typically contains a significant pool of resources, which could be reallocated to different purpose within short time frames, and allows the cloud owner to benefit significantly from economies of scale as well as from statistical multiplexing (Fig. 1.3). The entire process of requesting and receiving resources is typically automated and is completed in 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, eliminating the need for an up-front investment or a long-term contract. This presents a less disruptive business opportunity for businesses with spiky or unpredictable IT demands, as they are able.

Cloud Computing Hurdles

There are various hurdles in adopting the cloud for large-scale cloud deployment services. The first and foremost is security. Now because of new paradigm, the data security concern is more hyped for cloud, but in some manner it is same as securing the datacenter services, network, and storage in hosted and utility-based solutions. As the services are opened and delivered over the network between the cloud service provider and the consumer, the security in this model is perceived at higher levels. Other inhibitors can be location-independent resource pooling where consumer does not know where his services are running or where his data is stored. It is also believed that multi-tenant models are somewhat less secure than dedicated models. Limited service management and monitoring capabilities in the public cloud model also add to the complexities.

CLOUD ADOPTION

Business functions that suit cloud deployment can be low-priority business applications – such as analytics, against partner and field service-based functions – and other low-priority business functions. Cloud favors traditional Web applications and interactive application that comprise two or more data source and service with low availability requirements and shirt spans; for example, enterprise marketing campaigns need quick delivery of a promotion that can just as quickly be switched off. It is also helpful when high-volume, low-cost analytics and disaster recovery scenarios, business continuity, and backup/recovery-based implementation are required. It is like a boon to one-time batch processing with limited security requirements, record retention, media distribution, and mature packaged offerings, such as e-mail, collaboration infrastructure, and collaborative business networks.

Based on technical characteristics, we can say that cloud adoption is suitable for applications that are modular and loosely coupled, isolated workloads, single virtual appliance workloads; software development and testing, and pre-production systems. It gels well with research and development projects, prototyping to test new services, applications, and design models and applications that scale horizontally on small servers, that is, by adding more server's computational capacity.

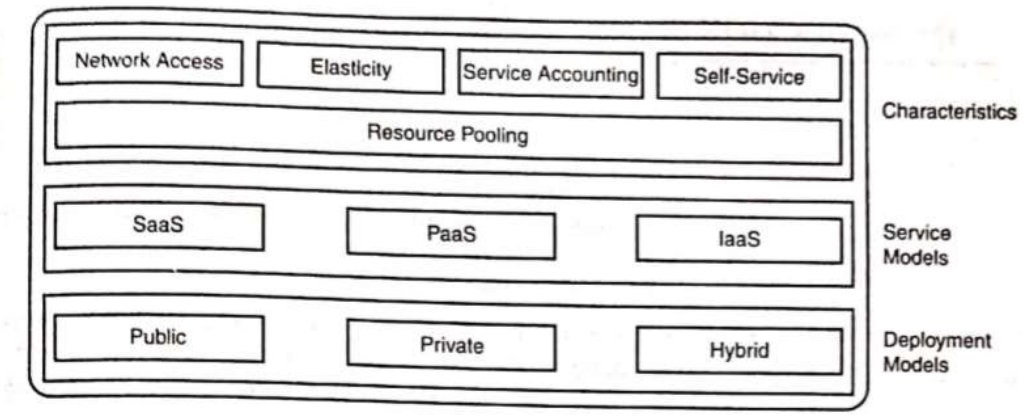
Applications that need significantly different levels of infrastructure throughout the day, such as those used almost solely during the business day, should be deployed through the cloud. Applications that need significantly different levels of infrastructure throughout the month, or that seasonal demand, such as those used primarily during the end-of –the –quarter or during a holiday shopping season, are the best examples of cloud deployments. Applications for which the demand is unknown in advance, for example, a Web-based application for a start-up organization, will need to support a spike in demand when they become highly demanding and will need to reduce once all the users turn away from the workload.

CLOUD CHARACTERISTICS

The cloud carries the carries the basic infrastructure characteristics that are helpful to deploy the cloud service in a fast and cost-effective way (fig.2.1). The characteristics discussed in the following subsections set apart the cloud from other computing techniques.

Self-Service On-Demand

As a cloud consumer, users are privileged to request and provision computing capabilities bundled with services with or without approval process powered by automation and workflows.



CLOUD RUDIMENTS

The cloud delivers a software platform that will enable the customer's IT department to build an infrastructure-as-a-service (IaaS) cloud. The cloud is built on capabilities of existing virtualization management and physical server provisioning solutions to deliver an application infrastructure to users that can be consumed in a self-service manner.

The cloud optimizes the usage of the physical and virtual infrastructure through intelligent resource allocation policies, and adds the ability to flex applications elastically based on demand. The high level capabilities of any cloud include the following:

Resource aggregation and integration: The cloud solution operates on the top of existing virtualization management environments. It retrieves inventory information about machines and software Templates from multiple locations, and aggregates this information into a central logical view of all resources in the infrastructure.

Application services: Rather than providing access to resources directly, cloud solutions' application 'Definitions' describes packages of machine capacity and software images that can be allocated by resource consumes. Applications can range from individual machines provisioned with an operating system image through to full multi-tier application environments that consist of collections of machines and software stacks provisioned in a specific order with network and storage dependencies handled through integration with third-party management tools.

Self-service portal: An important principle of a cloud solution is to enable self-service access to resources with minimal IT involvement. It should support the notion of account owners signing up for contracts and then being able to delegate the use of the purchased capacity within their own groups or departments. Users can request machines or entire multi-machine application environments and monitor and control them using a Web-based self-service portal. The system will drive the workflows necessary to create the environment and provide run-time environment management in order to support application elasticity.

Allocation engine: Dynamic Resource Management (DRM) is an automated allocation and reallocation of IT resources based on policies that express business demands and priorities. DRM is a key component of any cloud solution that maximizes the initially placing of the IaaS infrastructure. The cloud should also be able to meter the usage of the deployed instances in the public cloud. Customer datacenters could use resources in the public cloud for testing and development environment if there are no resources available on the premise, which will also help them to defer from new hardware procurement.

Automated Scaling

The cloud solution should provide an out-of-box functionality to flex-down an application instance or resource based on performance metrics and should also flex-up and flex-down an environment automatically or manually. The cloud solution should offer policies that can be customized to look at any metric and take action based on the threshold. These policies must be embedded in a service catalog to monitor an application or the entire environment and flex-up or flex-down with more resources.

Business Transparency

Service accounting helps improve the utilization of datacenter infrastructure, with accurate visibility into the true costs of physical and virtualized workloads. It enables decision makers to have cost transparency and accountability for usage, metrics, roles, and definitions. This would also help an administrator to understand whether a machine is equipped with right resources or not.

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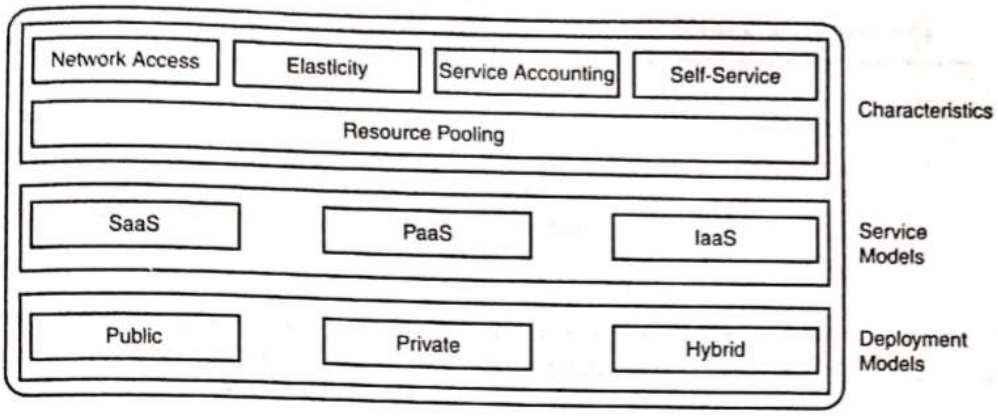

Fig-1. Cloud Model

Ubiquitous Network Access

This is the characteristics by which end-user and server computing devices can be accessed over the network even using the next generation heterogeneous devices such as smart phone, tablets, phablets, thin and thick clients.

Resource Pooling

This characteristic refers to the pooling of resource across multiple datacenters. These pooled virtual datacenters are then divided into multiple pools to provide their services to various consumers in a multitenant model. These pools can have both physical and virtual resources. Also, the devices provided by this pool give the notion of location-independent compute (storage, servers, processing, network bandwidth, virtual machines, etc.), where the consumer does not control or visibility about the service location and its geography.

Rapid Elasticity

This characteristic makes the provisioning rapid and elastic. This provisioning can be automatic and can flex-up and flex-down on the basis of spikes of utilization. The consumer can view the infinite capacity available as a service, which can be bought at any point of time.

MEASURED SERVICE ACCOUNTING

The cloud environment is optimized by effective workload management. This management requires measured service, monitoring, metering, and chargeback capability with the required abstraction, and optimization at user level. The usage of resources can be controlled, reported, monitored, charged, billed, and invoiced on actual from provider to consumers.

Now organizations are migrating to the cloud computing to

1. Derive the greatest flexibility and cost-reduction benefits from their cloud computing investments.
2. Avoid vulnerability to costly problems and delays arising from a trial-and-error method of migrating workloads.
3. Augment limited in-house resource or experience to rapidly develop an organization roadmap and smoothly migrate workloads to a cloud computing environment.

Cloud vendors can address client's challengers by

1. Prioritizing workloads for cloud adoption on the basis of business impact and risk.
2. Maximizing business return by identifying applications that are well suited for cloud computing and have high business impact.
3. Addressing problematic workloads to improve their propensity for cloud computing.
4. Avoiding costly implementation issues by identifying and addressing potential difficulties during the migration.
5. Mitigating the risk of costly implementation delays by identifying potential problems and addressing them before the migration.
6. Avoiding inadequate performance of highly complex and integrated workloads.

7. Leveraging the expertise to deliver an actionable roadmap to successfully migrate applications to a cloud computing environment.
8. Accelerating the cloud initiatives.

Cost Factor

There are a number of reasons why cloud computing is popular with businesses. One of them is the cost aspect. By virtualizing and standardizing your environment, you can deliver more services with fewer resources and drive up the utilization. By adding automation, you can reduce the labor cost which gives you an additional cost benefit. These advantages give you a lot of flexibility because you can access cloud services without thinking about the location and the time of their execution. So cloud computing allows an organization to free up the budget so that money can be diverted to new innovations and development of new capabilities rather than just keeping the lights on and running the IT enterprise.

Summing Up:

To sum up; the research scholar comes to the point that Cloud computing has the potential to become a frontrunner in promoting a secure, virtual and economically viable IT solution in the future. As the development of cloud computing technology is still at an early stage, this research effort will provide a better understanding of the design challenges of cloud computing, and pave the way for further research in this area. Cloud computing is a set of IT services that are provided to a customer over a network on a leased basis and with the ability to scale up or down their service requirements. Usually Cloud Computing services are delivered by a third party provider who owns the infrastructure. Cloud Computing holds the potential to eliminate the requirements for setting up of high-cost computing infrastructure for IT-based solutions and services that the industry uses. It promises to provide a flexible IT architecture, accessible through internet from lightweight portable devices. This would allow multi-fold increase in the capacity and capabilities of the existing and new software. This new economic model for computing has found fertile ground and is attracting massive global investment. In the present research paper; the research scholar has tried to present what cloud computing is, the various cloud models and the overview of the cloud computing architecture and its various importance and characteristics It is observed that many industries, such as banking, healthcare and education are moving towards the cloud due to the efficiency of services provided by the pay-per-use pattern based on the resources such as processing power used, transactions carried out, bandwidth consumed, data transferred, or storage space occupied etc. In a cloud computing environment, the entire data resides over a set of networked resources, enabling the data to be accessed through virtual machines.

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