VISVESVARAYA TECHNOLOGICAL UNIVERSITY
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A seminar report on
CLOUD COMPUTING

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VISVESVARAYA TECHNOLOGICAL UNIVERSITY
BELGAUM

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CERTIFICATE

Certified that the seminar work entitled "CLOUD COMPUTING" is a bonafide work presented by Priyanka R. Nayak bearing USN 2SD06CS069 in a partial fulfillment for the award of degree of Bachelor of Engineering in Computer Science Engineering of the Vishveshwaraiah Technological University, Belgaum during the year 2009-10. The seminar report has been approved as it satisfies the academic requirements with respect to seminar work presented for the Bachelor of Engineering Degree.

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1.INTRODUCTION

Cloud computing is the next natural step in the evolution of on-demand information technology services and products. To a large extent cloud computing will be based on virtualized resources. The idea of cloud computing is based on a very fundamental principal of `reusability of IT capabilities`. The difference that cloud computing brings compared to traditional concepts of "grid computing", "distributed computing", "utility computing", or "autonomic computing" is to broaden horizons across organizational boundaries.

According to the IEEE Computer Society Cloud Computing is:

"*A paradigm in which information is permanently stored in servers on the Internet and cached temporarily on clients that include desktops, Entertainment centers, table computers, notebooks, wall computers, handhelds, etc*."

Though many cloud computing architectures and deployments are powered by grids, based on autonomic characteristics and consumed on the basis of utilities billing, the concept of a cloud is fairly distinct and complementary to the concepts of grid, SaaS, Utility Computing etc. In theory, cloud computing promises availability of all required hardware, software, platform, applications, infrastructure and storage with an ownership of just an internet connection.

people can access the information that they need from any device with an Internet connection—including mobile and handheld phones—rather than being chained to the desktop. It also means lower costs, since there is no need to install software or hardware."

Cloud computing used to posting and sharing photos on orkut, instant messaging with friends maintaining and upgrading business technology

2. Concepts

A powerful underlying and enabling concept is computing through service-oriented architectures (SOA) - delivery of an integrated and orchestrated suite of functions to an end-user through composition of both loosely and tightly coupled functions, or services - often network based. Related concepts are component-based system engineering, orchestration of different services through workflows, and virtualization.

2.1. Cyber infrastructure

Cyber infrastructure makes applications dramatically easier to develop and deploy, thus expanding the feasible scope of applications possible within budget and organizational constraints, and shifting the scientist's and engineer's effort away from information technology development and concentrating it on scientific and engineering research. Cyber infrastructure also increases efficiency, quality, and reliability by capturing commonalities among application needs, and facilitates the efficient sharing of equipment and services.

Today, almost any business or major activity uses, or relies in some form, on IT and IT services. These services need to be enabling and appliance-like, and there must be an economy of- scale for the total-cost-of-ownership to be better than it would be without cyber infrastructure. Technology needs to improve end-user productivity and reduce Technology-driven overhead

2.2. Service-Oriented Architecture

SOA is not a new concept, although it again has been receiving considerable attention in recent years [e.g., Bel08, IBM08a]. Examples of some of the first network-based service-oriented architectures are remote procedure calls (RPC), DCOM and Object Request Brokers (ORBs) based on the CORBA specifications . A more recent example are so called "Grid Computing" architectures and solutions . In an SOA environment end-users request an IT service (or an integrated collection of such services) at the desired functional, quality and capacity level, and receive the reponse at the time requested or at a specified later time. Service discovery, brokering, and reliability are important .Goal of the SOA is that creating an architecture in which servises are able to communicate using http protocol It is expected that in the next 10 years, service-based solutions will be a major vehicle for delivery of information and other IT assisted functions at both individual and organizational levels.

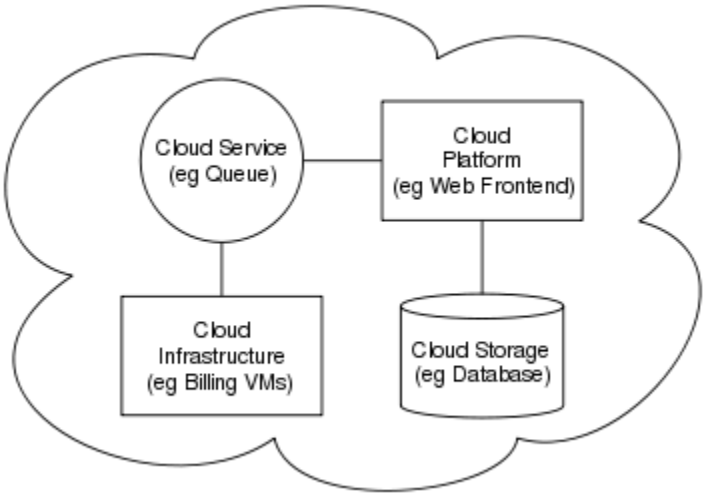
e.g., software applications, web-based services, personal and business "desktop" computing.

3 Cloud Architecture

Cloud architecture the systems architecture of the software systems involved in the delivery of *cloud computing*, comprises hardware and software designed by a *cloud architect* who typically works for a *cloud integrator*. It typically involves multiple *cloud components* communicating with each other over application programming interfaces, usually web services.

This closely resembles the Unix philosophy of having multiple programs doing one thing well and working together over universal interfaces. Complexity is controlled and the resulting systems are more manageable than their monolithic counterparts.

Cloud architecture extends to the client, where web browsers and/or software applications access *cloud applications*. *Cloud storage architecture* is loosely coupled, where metadata operations are centralized enabling the data nodes to scale into the hundreds, each independently delivering data



to applications or users

Fig 3 Cloud Architecture

3.1. Cloud –Types

Public cloud:

Public cloud or external cloud describes cloud computing in the traditional mainstream. Public clouds are run by third parties, and applications from different customers are likely to be mixed together on the cloud's servers, storage systems, and networks. A public cloud provides services to multiple customers.

Hybrid cloud:

Hybrid clouds combine both public and private cloud models. This is most often seen with the use of storage clouds to support Web 2.0 applications.

Private cloud:

Private clouds are built for the exclusive use of one client, providing the utmost control over data, security, and quality of service (Figure 4). The company owns the infrastructure and has control over how applications are deployed on it. Private clouds can be built and managed by a company's own IT organization or by a cloud provider

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Cloud computing products and services can be classified into 4 major categories:

They are

1. Application as service (AaaS)
2. Platform as a Service (PaaS)
3. Infrastructure as a service (IaaS)
4. Software as a Service (SaaS)

1. Application as s service (AaaS): These are the first kind of cloud computing services that came into being. Under this, a service is made available to an end-user. The end-user is asked to create an account with the service provider and start using the application. One of first famous application was web-based email service by hotmail started in 1996. Scores of such services are available now on the web.

2. Platform as a Service (PaaS): Cloud vendors are companies that offer cloud computing services and products. One of the services that they provide is called PaaS. Under this a computing platform such as operating system is provided to a customer or end user on a monthly rental basis. Some of the major cloud computing vendor are Amazon, Microsoft, Google etc

3. Infrastructure as a service: The cloud computing vendors offer infrastructure as a service. One may avail hardware services such as processors, memory, networks etc on agreed basis for specific duration and price.

4. Software as a service (SaaS): Software package such as CRM or CAD/CAM can be accessed under cloud computing scheme. Here a customer upon registration is allowed to use software accessible through net and use it for his or his business process. The related data and work may be stored on local machines or with the service providers. SaaS services may be available on rental basis or on per use basis.

4.Component

The key to a SOA framework that supports workflows is componentization of its services, an ability to support a range of couplings among workflow building blocks, fault-tolerance in its data- and process-aware service-based delivery, and an ability to audit processes, data and results, i.e., collect and use provenance information. Component-based approach is characterized by ***reusability*** (elements can be re-used in other workflows), ***substitutability*** (alternative implementations are easy to insert, very precisely specified interfaces are available, run-time component replacement mechanisms exist, there is ability to verify and validate substitutions, etc), ***extensibility and scalability (***ability to readily extend system component pool and to scale it, increase capabilities of individual components, have an extensible and scalable architecture that can automatically discover new functionalities and resources, etc),***customizability*** (ability to customize generic features to the needs of a particular scientific domain and problem), and ***composability*** (easy construction of more complex functional solutions using basic components, reasoning about such compositions, etc.). There are other characteristics that also are very important. Those include **reliability and availability** of the components and services, the cost of the services, **security**, total cost of ownership, economy of scale, and so on.In the context of cloud computing we distinguish many categories of components. From differentiated and undifferentiated hardware, to general-purpose and specialized software and applications, to real and virtual "images", to environments, to no-root Differentiated resources, to workflow-based environments and collections of services, and soon.

4.1 Virtualization

Virtualization is another very useful concept. It allows abstraction and isolation of lower-level functionalities and underlying hardware. This enables portability of higher-level functions and sharing and/or aggregation of the physical resources. The virtualization concept has been around in some form since 1960s (e.g., in IBM mainframe systems). Since then, the concept has matured considerably and it has been applied to all aspects of computing – memory, storage, processors, software, networks, as well as services that IT offers. It is the combination of the growing needs and the recent advances in the IT architectures and solutions that is now bringing the virtualization to the true commodity level. Virtualization, through its economy of scale, and its ability to offer very advanced and complex IT services at a reasonable cost, is poised to become, along with wireless and highly distributed and pervasive computing devices, such as sensors and personal cell-based access devices, the driving technology behind the next waive in IT growth .Not surprisingly there are dozens of virtualization products, and a number of small and large companies that make them. Some examples in the operating systems and software applications space are VMware1, Xen - an open source Linux-based product developed

by XenSource2, and Microsoft virtualization products, to mention a few. Major IT players have also shown a renewed interest in the
technology. Classical storage players such as EMC10, NetApp11, IBM12
and Hitachi13 have not been standing still either. In addition, the network virtualization market is teeming with activity.

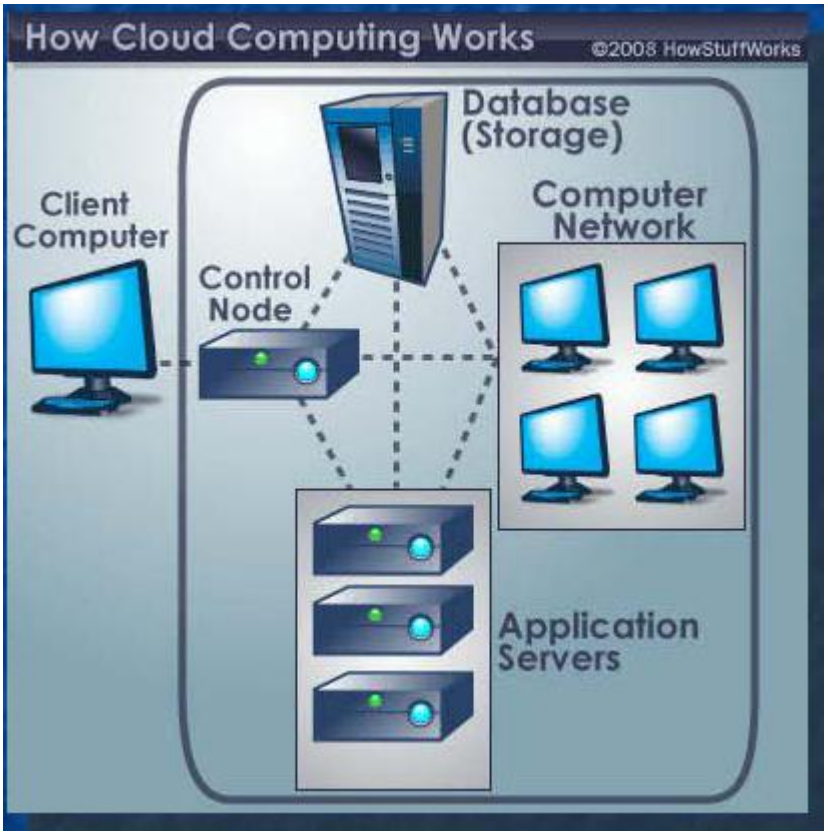
4.2 Users

The most important Cloud entity, and the principal quality driver and constraining influence is, of course, the user. The value of a solutions depends very much on the view it has of its end-user requirements and user categories.
There four broad sets of nonexclusive user categories:

System or Cyber infrastructure (CI) developers, developers (authors) of different component services and underlying applications, technology and domain personnel that integrates basic services into composite services and their orchestrations (workflows) and delivers those to end-users, and finally users of simple and composite services. User categories also include domain specific groups, and indirect users such as stakeholders, policy makers, and so on. Functional and usability requirements derive, in most part, directly from the user profiles.

Working Of Cloud Computing:

Cloud Computing system can be divided it into two sections: the **front end** and the **back end**. They connect to each other through a network, usually the Internet. Thefront end is the side the computer user, or client, sees.**The back end** is the "cloud" section of the system. On the back end there are various computers,servers and data storage systems that create the "cloud" of computing services.A central server administers the system, monitoring traffic and client demands to ensure everything runs smoothly. It followsa set of rules called protocols Servers and remote computers do most of the work and store the data.



6. Merits & Demerits:

Merits:

Cloud enabler technologies like utility computing, Grid Computing, RTI, web infrastructure and others are cloud enabled.

1. Infrastructure service providers are taking advantage of the Cloud services.

2. Information services, entertainment-oriented services such as video on demand, simple business services such as customer authentication or identity management and contextual services such as location or mapping services are positioned well by using the service.

3. Other services, such as corporate processes (for example, billing, deduction management and mortgage calculation) and transactional services (for example, fiscal transactions), would take longer to reach the cloud and the mainstream.

4. Cloud computing infrastructures allows efficient use of their IT hardware and software investments

5. A cloud infrastructure can be a cost efficient model for delivering information services, reducing IT management complexity.

6. The Cloud makes it possible to launch Web 2.0 applications quickly and to scale up applications as much as needed when needed.

Demerits:

Stored data might not be secure**:** With cloud computing, all our data is stored on the cloud. The unauthorized users gain access to our confidential data.

Dependent on internet connection:Internet connectivity isn't completely stable and reliable.

It's not platform agnostic:Most clouds force participants to rely on a single platform or host only one type of product.

Can be slow:Even on a fast connection,web based application scan sometimes be slower than accessing a similar software program on our desktop PC

7.Conclusion

"Cloud" computing builds on decades of research in virtualization, distributed computing, utility computing, and more recently networking, web and software services. It implies a service oriented architecture, reduced information technology overhead for the end-user, great flexibility, reduced total cost of ownership, ondemand services and many other things.

In today's global competitive market, companies must innovate and get the most from its resources to succeed. Cloud computing infrastructures are next generation platforms that can provide tremendous value to companies of any size. They can help companies achieve more efficient use of their IT hardware and software investments and provide a means to accelerate the adoption of innovations.Cloud computing increases profitability by improving resource utilization. Costs are driven down by delivering appropriate resources only for the time those resources are needed. Cloud computing has enabled teams and organizations to streamline lengthy procurement processes.

Cloud computing enables innovation by alleviating the need of innovators to find resources to develop, test, and make their innovations available to the user community. Innovators are free to focus on the innovation rather than the logistics of finding and managing resources that enable the innovation.

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