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Cloud and Data Center for Real Time Applications

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ABSTRACT: Data centres are centres that hosts hundreds of thousands of servers which concurrently supports many services and applications. Requirement of data centre are power supply, security systems, etc. Data centres are not only serving data but also pulling information from variety of servers and running specialized programs based on user input. Cloud computing is used to describe a new class computing that takes place over the internet. Using the internet for communication and transport CC provides hardware, software and networking services to client in three forms SaaS, PaaS and IaaS. We can categories cloud in various types public, private, community, etc. It provides self-service and anywhere, anytime access, utility services. A cloud data centre moves a traditional on-prem data centre off-site. Instead of personally managing their own infrastructure, an organization leases infrastructure managed by a third- party partner and accesses data centre resources over the Internet. Three types of cloud data centres are IaaS, PaaS and SaaS. They are cost free and can easily manage large scale of data in one device and are accessible anywhere.

KEYWORDS: Cloud Computing, QoS, SaaS, PaaS, IaaS, PSO, Cloud Scheduling, Green cloud, Resource management, Virtualization, Dynamic consolidation

I. INTRODUCTION

The concept of cc was first propounded by John Mc Cathy way back in 1961, wherein he envisaged the idea of computer time sharing technology. His ideas and concept grew with time to become a reality. As they say nothing is beyond human contrivance and utilitarian aspects always egg man to strive for excellence. Today computing power and even specific applications could be sold through the utility business model like water and electricity and made available on-demand in metered way. So what cathey faintly dreamed about half a century ago took the shape of internet based computing and has been christened as cloud computing. Cloud Computing is a relatively new technology and aims to offer “utility based IT services”.

1. Like other public utility services wiz water supply, electricity, cooking gas and telephone etc. cloud computing is also considered a utility service which can be availed of on demand. It can also be rented out or charged in a metered way. Our modern society is increasingly relying on the collection, processing and sharing of digital information.

2. Cloud computing is an arena that is ruling the world of information technology.

3. If we reflect and closely observe we find that the cluster computing of the last decade of the twentieth century followed by grid computing were earlier version of cloud computing. From 2002 onwards it started carving a niche of it's own in the mammoth edifice of information technology.

II. LITERATURE SURVEY

A. History of Computing:

When the era of personal computers began in the 1970s, it was generally called micro-computers. It later became an affordable consumer goods when the microprocessors where developed. The workstation computers started in the 1990s. With various developments of hardware and processor components, the computers became much more easily available for cheaper costs. The applications that were running on the personal computers were platform dependent and there was no direct connectivity to share data from one to another. Security was a major concern during this time. System administration and responsibility of data, system crash and virus infections became widespread. It was Tim Berners Lee who developed the World Wide Web in the early 1990s. With the introduction of web browser, the World Wide Web found a turning point. The dot com bubble came into picture. Many companies found success developing

various business models. Cloud computing has evolved through a number of phases that includes grid and utility computing and Software as a Service (SaaS). Though the idea and concept of computer network in global terms was thought in the 1960s, cloud computing came into light when internet started offering its service. Cloud computing reached the public in the year 2007. The model of Cloud computing changed how computers could be used and how information could be spread. Google provided the search engine that could be accessed for free from any internet connected computer.

B. Types of Cloud Computing :

There are different ways in which a cloud environment can be deployed. Figure 6 [15] shows the different types of cloud computing can be deployed are

- Public Cloud
- Community Cloud
- Hybrid cloud and hybrid IT delivery
- Combined Cloud
- Private Cloud

C. Cloud Scheduling:

The Scheduling [18] is a key concept in computer multitasking, multiprocessing operating system and real-time perating system designs. Scheduling refers to the way processes are assigned to run on the available CPUs, since there are typically many more processes running than there are available CPUs. This assignment is carried out by software known as a scheduler or dispatcher. A Scheduling algorithm is the method by which threads, processes or data flows are given access to system resources. This is usually done to load balance a system effectively or achieve a target quality of service. The need for a scheduling algorithm arises from the requirement for most modern systems to perform multitasking and multiplexing. Scheduling refer to the way process are assigned to run on the available CPU.

- Job scheduling [19] is a fundamental issue in achieving high performance in cloud computing systems. However, it is a big challenge for efficient scheduling algorithm design and implementation. Unlike scheduling problems in conventional distributed systems, this problem is much more complex as new features of cloud systems such as its dynamic nature. And the high degree of heterogeneity of jobs and resources must be tackled. Job scheduling in computational cloud is a multi-objective optimization problem.

D. Purpose of the System:

- Cloud computing environments facilitate applications by providing virtualized resources that can be provisioned dynamically. However, users are charged on a pay-per-use basis. User applications may incur large data retrieval and execution costs when they are scheduled taking into account only the „execution time“. • In addition to optimizing execution time, the cost arising from data transfers between resources as well as execution costs must also be taken into account. In this project, we present a Particle swarm optimization (PSO) based heuristic to schedule applications to cloud resources that takes into account both computation cost and data transmission cost. We experiment with workflow application by varying its computation and communication costs.

E. Scope:

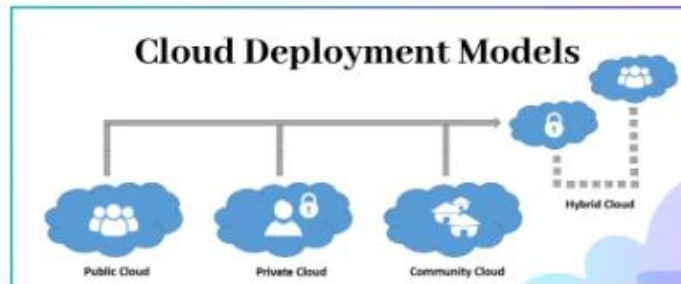
- The CLOUD Scheduler is intended to work as an add-on to the queuing, scheduling and resource managing module of the open-source CLOUD Engine resource management system, previously known as SCHEDULER IN CLOUD. The scheduler will offer market-based economy driven service for managing batch jobs on clouds by scheduling CPU time according to user utility rather than system performance considerations. Hence, the main objective of CLOUD SCHEDULER is to provide Quality of Service (QoS) computational economy in CLOUD computing.

F. Virtualization:

- When we observe that an application no longer need an exclusive server we can club number of application and can make them run on a single server off course within it's capacity to handle that load. This is what we mean by term virtualization. It significantly decrease the amount of hardware required.
- The virtual world products such as XEN, VMware and Hyper-Vare part of the green cloud computing, those virtual products have advanced methods to reduce the computing power consumption

G. Deployment Models:

- There are four models in which cloud computing is deployed.
 - Private cloud: Here the user is single organization. It is controlled and managed by IT department of the host organization. Eucalyptus system is the best example of private cloud.
 - Public cloud: Here number of organizations can use it on shared basis. It may be hosted and managed by a
- G. Deployment Models:



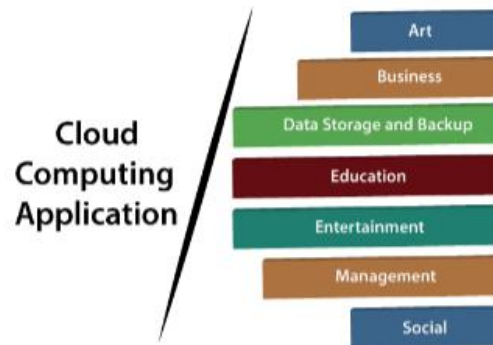
- There are four models in which cloud computing is deployed.
- Private cloud: Here the user is single organization. It is controlled and managed by IT department of the host organization. Eucalyptus system is the best example of private cloud.
- Public cloud: Here number of organizations can use it on shared basis. It may be hosted and managed by a third party acting as a cloud service provider. E.g Google app engine, Microsoft azure.
- Hybrid cloud: A single organization may opt to avail benefits accruing both from private cloud and public cloud. Such a use is called hybrid cloud. E.g. Amazon web services.
- Community cloud: Related or cognate organization may wish to make use of common cloud computing environment. This mode of use of cloud computing is termed as community cloud. E.g. Government cloud.

H. Three Service Models:



- Software as a service [SaaS]: All applications availed as service typically through web browser by end user. E. g. salesforce.com, google apps. • Platform as a service [PaaS]: Here a application development & deployment platform is provided as service to software developer, so that he can build, deploy application. E.g. Microsoft Azure, Google App Engine.
- IaaS is also known as Hardware as a Service (HaaS): It is a computing infrastructure managed over the internet. The main advantage of using IaaS is that it helps users to avoid the cost and complexity of purchasing and managing the physical servers.
- Platform as a Service (PaaS): PaaS cloud computing platform is created for the programmer to develop, test, run, and manage the applications. Example: AWS Elastic Beanstalk, Windows Azure, Heroku, Force.com, Google App Engine, Apache Stratos, Magento Commerce Cloud, and OpenShift.

III. APPLICATIONS OF CLOUD COMPUTING



1. Art Applications

Cloud computing offers various art applications for quickly and easily design attractive cards, booklets, and images. Some most used cloud art applications are given below:

- Moo: It is used for designing and printing business cards, postcards, and mini cards.
- Vistaprint: To design various products like business cards, Postcards, Booklets, and wedding invitations cards.
- Adobe Creative Cloud: It is a suite of apps which includes Photoshop image editing programming, Illustrator, In Design, Type Kit, Dreamweaver, XD, and Audition.

2. Business Applications

Today, every organization requires the cloud business application to grow their business. It also ensures that business applications are 24*7 available to users. There are the following business applications of cloud computing –

- Bitrix24: Bitrix24 is a collaboration platform which provides communication, management and social collaboration tools. Others are-
- MailChimp
- Salesforce
- Chatter
- PayPal

3. Data Storage and Backup Applications

Cloud computing allows us to store information (data, files, images, audios, and videos) on the cloud and access this information using an internet connection. As the cloud provider is responsible for providing security, so they offer various backup recovery application for retrieving the lost data.

4. Education Applications

Cloud computing in the education sector becomes very popular. It offers various online distance learning platforms and student information portals to the students. The advantage of using cloud in the field of education is that it offers strong virtual classroom environments, Ease of accessibility, secure data storage, scalability, greater reach for the students, and minimal hardware requirements for the applications.

There are the following education applications offered by the cloud -

- Google Apps for Education
- AWS in Education

5. Management Applications

Cloud computing offers various cloud management tools which help admins to manage all types of cloud activities, such as resource deployment, data integration, and disaster recovery. These management tools also provide administrative control over the platforms, applications, and infrastructure.

6. Social Applications

Social cloud applications allow a large number of users to connect with each other using social networking applications such as Facebook, Twitter, LinkedIn, etc.

There are the following cloud based social applications -

- i. Facebook
- ii. Twitter
- iii. Yammer
- iv. LinkedIn

IV. ADVANTAGES

As we all know that Cloud computing is trending technology. Almost every company switched their services on the cloud to rise the company growth.

Here, we are going to discuss some important advantages of Cloud Computing-

1) Back-up and restore data:

Once the data is stored in the cloud, it is easier to get back-up and restore that data using the cloud.

2) Improved collaboration:

Cloud applications improve collaboration by allowing groups of people to quickly and easily share information in the cloud via shared storage.

3) Excellent accessibility:

Cloud allows us to quickly and easily access store information anywhere, anytime in the whole world, using an internet connection. An internet cloud infrastructure increases organization productivity and efficiency by ensuring that our data is always accessible.

4) Low maintenance cost:

Cloud computing reduces both hardware and software maintenance costs for organizations.

5) Mobility:

Cloud computing allows us to easily access all cloud data via mobile.

6) iServices in the pay-per-use model: Cloud computing offers Application Programming Interfaces (APIs) to the users for access services on the cloud and pays the charges as per the usage of service.

7) Unlimited storage capacity:

Cloud offers us a huge amount of storing capacity for storing our important data such as documents, images, audio, video, etc. in one place.

8) Data security:

Data security is one of the biggest advantages of cloud computing. Cloud offers many advanced features related to security and ensures that data is securely stored and handled.

V. DISADVANTAGE

Despite its many advantages, cloud computing is not without its issues. You should be aware of these if you're reconsidering moving your business into the cloud.

1) Most cloud service providers implement relevant security standards and industry certifications to ensure that their cloud environment remains safe. However, storing data and business-critical files in virtual data centers can potentially open you up to risks.

Common risks are:

- a. data loss or theft
- b. data leakage
- c. account or service hijacking
- d. insecure interfaces and APIs
- e. denial of service attacks
- f. technology vulnerabilities, especially in shared environments

2) Cloud downtime

The cloud, like any other IT set-up, can experience technical problems such as reboots, network outages and downtime. These events can incapacitate business operations and processes, and can be damaging to business.

3) Limited control



The cloud service provider owns, manages and monitors the cloud infrastructure. You, as the customer, will have minimal control over it. You will be able to manage the applications, data and services operated on the cloud, but you won't normally have access to key administrative tasks, such as updating and managing firmware or accessing server shell.

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