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The Future of Cloud Computing: Other Developments BPM and HPC

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ABSTRACT

The paper discusses the most discussed topic nowadays 'cloud computing'. Cloud computing is becoming a buzzword. The paper explains the concept, Services provided by cloud computing and different service providers. Also it works out how this technology can be harnessed to bring benefits to the challenges of the business, in terms of cost reduction and maintain competitiveness and also describing about other developments like Business Process Management, High Performance Computing.

Keywords: Grid computing, IaaS, PaaS, SaaS, BPM, HPC.

INTRODUCTION:

The term 'cloud computing' refers to computing services available to anyone online. Cloud computing is a style of computing in which dynamically scalable and often virtualized resources are provided as a service over the Internet.

1. COMPONENTS OF CLOUD COMPUTING:

Figure 1: Components of Cloud Computing

A. CLIENTS:

A cloud client consists of computer hardware and/or computer software which relies on cloud computing for application delivery, or which is specifically designed for delivery of cloud services and which, in either case, is essentially useless without it.

B. SERVICES:

A cloud service includes "products, services and solutions that are delivered and consumed in real-time over the Internet. For example, Web Services which may be accessed by other cloud computing components and software.

C. APPLICATIONS:

A cloud application leverages the Cloud in software architecture, often eliminating the need to install and run the application on the customer's own computer, thus alleviating the burden of software maintenance, ongoing operation, and support.

D. PLATFORM:

A cloud platform, such as Platform as a service, the delivery of a computing platform, and/or solution stack as a service, facilitates deployment of applications without the cost and complexity of buying and managing the underlying hardware and software.

E. STORAGE:

Cloud storage involves the delivery of data storage as a service, including database-like services, often billed on a utility computing basis.

F. INFRASTRUCTURE:

Cloud infrastructure, such as Infrastructure as a service, is the delivery of computer infrastructure, typically a platform virtualization environment, as a service

2. SERVICES PROVIDED BY CLOUD COMPUTING:

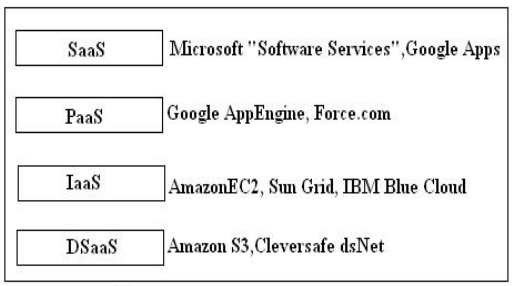

Fig 2: Services of Cloud computing

A. SOFTWARE AS A SERVICE (SAAS):

The software applications like CRM, Office Suite, Email, etc., are offered as a service through the internet, instead of a shrink wrapped software on a physical medium (or in a downloadable form), which is the norm in the traditional desktop world. The applications are hosted on a highly scalable infrastructure and it is offered over the internet. Users can access it using an ordinary web browser, without any need to install software in their local computer. Companies like Google, Zoho, Salesforce, Microsoft, Wordpress offer their applications as a service to the end users.

B**. PLATFORM AS A SERVICE (PAAS):**

Some vendors are offering application development platform as a service. Developers can code the applications and upload it into the platform (offered as a service) and run the application on the cloud infrastructure. It helps developers to scale their apps without worrying about building the infrastructure. The platform scales automatically based on the resource needs of the app, without any efforts from the developer. Services like Google App Engine, Bungee Connect and Force.com are examples for PaaS.

C. INFRASTRUCTURE/HARDWARE AS A SERVICE (HAAS):

Vendors offer computing infrastructure as a service to end users. The term Hardware as a Service is a bit of a misnomer. It is actually computing power offered through a virtualized environment rather than a physical hardware. This service is offered either as raw computing power or storage or both. Some examples of services offered in this category include Amazon's EC2 and S3, Mozy, GoGrid, etc.

3. CLOUD COMPUTING VS. GRID COMPUTING:

Grid computing is the application of several computers to a single problem at the same time - usually to a scientific or technical problem that requires a great number of computer processing cycles or access to large amounts of data. Grid computing depends on software to divide and divide up pieces of a program among several computers, sometimes up to many thousands.

This technology has been applied to computationally intensive scientific, mathematical, and academic problems through volunteer computing, and it is used in commercial enterprises for such diverse applications as drug discovery, economic forecasting, seismic analysis, and back-office data processing in support of e-commerce and Web services.

Cloud computing is Internet ("cloud") based development and use of computer technology ("computing"). It is a style of computing in which dynamically scalable and often virtualized resources are provided as a service over the Internet.

Users need not have knowledge of, expertise in, or control over the technology infrastructure "in the cloud" that supports them.

4. WORKING OF CLOUD COMPUTING:

In theory the process is very simple. Cloud computing could allow you to have only a small computer, inexpensive computer, processor and monitor in front of you. You would have no need for a hard drive or a CD/DVD drive. Instead you would need only an Internet connection, which would hook you up to a central supercomputer that would host all your programs and files. This presents and advantage to both storage and security issues.

5. EXAMPLE OF CLOUD COMPUTING USAGE:

There are different examples of cloud computing like Email communication now plays a central role in most of our busy lives. We carry a mobile WiFi-enabled laptop with us everywhere we go or use push email on our cell phone, having an email client sitting on our computer at home means that while out and about us risk spending time outside of the communication loop. This is one area where the cloud finds its most frequent and useful application.

Sometimes you may find yourself in need of the opinion of your colleagues. Downloading files onto flash memory, emailing documents to friends or family or colleagues or sending submissions by mail. Google launched a service that allowed groups of people to work on the same document, idea or proposal in real time or whenever convenient to each participant.

Using Google Wave you can create a document and then invite others to comment, amend, offer opinion, or otherwise join in with the creation of the final draft. Google is not alone in producing online collaboration tools. Other examples include Spicebird, Mikogo, Stixy and Vyew to name but a few.

For the dedicated cloud enthusiast, something like Amazon's EC2 virtual computing environment might be the answer to all our needs. Rather than purchasing servers, software, network equipment and so on, users would buy into a fully outsourced set of online services instead.

Most cloud environments on offer can customize the kind of service provided to exactly suit the needs of the user. If we need more processing power from time to time, a cloud-based infrastructure, being scalable, negates the need for up-front investment in client-owned resources.

Data stored on our home or business computer suffers from many of the same restrictions as email and, as with email, the cloud offers a solution. Storing our MP3's, video, photos and documents online instead of at home gives use the freedom to access them wherever we can

find the means to get online.

A. EXAMPLES OF ONLINE STORAGE SERVICES:

It includes Humyo, ZumoDrive, Microsoft's SkyDrive, S3 from Amazon, amongst others. Many offer both free and paid for storage and backup solutions.

B. GOOGLE AS FORE RUNNER OF CLOUD COMPUTING:

Online suite of office applications is probably the best known but by no means the only solution on offer. Rather than having a system and space hogging suite of applications like a word processor, a spreadsheet creator and a presentation or publishing platform sitting on your computer, you could opt to work online instead. Accessibility, potential for collaboration and perhaps even online storage are just some of the benefits of satisfying your office suite needs by working online.Google is currently the fore runner of cloud computing due to its need to produce accurate and instant results for the millions of search queries it receives every day.

6. PROPERTIES OF CLOUD COMPUTING:

There are different key properties of cloud computing like

- ✓ Task-Centric
- ✓ Powerful
- ✓ User-Centric
- ✓ Programmable
- ✓ Accessible

7. MAJOR SERVICE PROVIDERS OF CLOUD COMPUTING:

A. GOOGLE 101-NETWORK:

Made up of millions of cheap servers, that would store staggering amounts of data, including numerous copies of worldwide web. It makes search faster, helping ferret out answers to millions of queries in a fraction of a second.

B. MICROSOFT'S AZURE:

It is a Internet- scale cloud computing and services platform hosted in MS data centers. It provides a range of functionality to build applications that span from consumer web to enterprise scenarios.

C. AMAZON'S ELASTIC COMPUTE CLOUD-AMAZON EC2:

This is a web service interface that provides resizable computing capacity in a cloud. It is designed to make web-scale computing easy for developers. It allows developers to pay only for capacity that they actually use.

D. IBM'S CLOUDBRUST:

It is developed for the everyday user. IBM also offers private cloud computing services using IBM blue services software

8. OTHER DEVELOPMENTS:

Cloud computing addresses issues that relate strongly to other research and development areas, as already shown in section II.C. Due to overlap with many existing technologies, developments under way in these areas may have an impact on future cloud provisioning systems. As this exceeds the scope of this report, we will only indicate the most prominent areas in the following:

A. HIGH PERFORMANCE COMPUTING (HPC):

HPC has been dealing with resource pooling and code distribution, reliable execution etc. for a long time now. Though clouds and HPC act on different levels (HPC nodes being more tightly coupled than resources in the cloud), and integrating HPC resources into clouds may not be sensible, there is still a strong overlap between cap abilities and boundary conditions that have been investigated in HPC for decades now.

This relates in particular to aspects on scheduling, code & data distribution and communication, as well as reliable execution – all issues particularly relevant for distributed, virtual (and dynamic) resource platforms as exposed by the cloud. Depending on the problem domain [50] cloud computing could provide efficient, but also economic viable HPC platforms (example: off peak hour's computation and data manipulation vs. guaranteed QoS).

It may be worth noting in this context, that there is a steady movement from HPC technologies to common server machines and even end-user desktops, which may impact on cloud systems in so far, as that they have to cater for complete new resources and hence new management models.

B. BUSINESS PROCESS MANAGEMENT (BPM):

The role of Business Process Management (BPM) technology will increase significantly with the omnipresence of clouds. First of all, the huge number of services available in the cloud will enable a fast and easy creation of new higher-level services by composing the available services. Secondly, the ubiquitous access to application functionality will result in the formation of networks between partners to create competitive advantage by establishing cross-partner business processes.

Cloud technology will significantly ease both, the offering as well as the use of services available. As a consequence, a huge number of services will be available in the cloud and these services will be composed into new services. These services may become available on the cloud again (Composite as a Service) further increasing the number of services in the cloud. The composition of services into new services is supported by orchestration technology. Orchestrations are typically defined by domain experts with some level of IT skill. Supporting a much broader community in composing new services, easier and domain-specific languages for orchestrations have to be provided.

The availability of cheap services providing broad application functionality to everybody implies that companies can no longer distinguish themselves by the

use of such (formerly expensive) application functions. One way to distinguish oneself will be the cooperation with partners by establishing a partner network. Much such cooperation will be defined by means of choreography technology reflecting the partner networks. Such choreographies define cross-partner business processes defining very complex and optimized interactions between the partners.

The business processes describing the local partner behavior will be hosted and run in the cloud, being integrated into choreography. The competitive advantage of a partner network will be monitored and analyzed continuously and adapted if needed by exchanging individual partners and the representing choreography it.

The goal of BPM is to identify the internal business processes of an organization, capture these processes in process models, manage and optimize these processes by monitoring and reviewing them.

Business process management is based on the observation that each prod-uct that a company provides to the market is the outcome of a number of activities performed. These activities can be performed by humans, systems or a combination of both. By identifying and structuring these activities in work flows, companies get insight into their business processes.

By monitoring and reviewing their processes, companies are able to identify the problems within these processes and can come up with improvements.

There are real benefits from cloud and BPM:

•Quick start, no IT hassle and focus on business value

•Pay-as-you-go subscription model

•High degree of collaboration such as collaborative modeling

•Orchestration of cloud services

9. APPLICATIONS AND ADVANTAGES OF CLOUD COMPUTING:

There are various applications of cloud computing in today's network world. Many search engines and social websites are using the concept of cloud computing like www.amazon.com, hotmail.com, facebook.com, linkedln.com etc. the advantages of cloud computing in context to scalability is like reduced risk , low cost testing ,ability to segment the customer base and auto-scaling based on application load.

10. INDIA TO USE THE 'CLOUD' SERVICES FOR E-GOVERNANCE:

India is to become one of the first countries in the world to deliver e-Governance services to citizens using cloud-based IT services. The government is in talks with software industry body, Nasscom, on the roll-out of e-Governance services using the emerging technology. The advantage of using this technology is that the IT infrastructure need not be set up by the government. In addition, because of the ability of the technology to handle large number of transactions, citizens can look forward to less congestion bottlenecks.

11. CONCLUSION:

Cloud computing will promote the use of shared resources and when we are sharing the resources among different users it will definitely lower the costs and will help in keeping the environment clean. Cloud computing will also help in e-learning and Business Process Management, High Performance Computing by providing many services online for the students. We need to strap up this technology in our daily lives by creating many applications on cloud.

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