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Proceedings of International Conference On Global Innovations In Computing Technology (ICGICT'14)

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Department of CSE, JayShriram Group of Institutions, Tirupur, Tamilnadu, India on 6th & 7th March 2014

Camerareadycopy-ICGICT-403-Cloud Computing (Networks)

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ABSTRACT: 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, tablet computers , notebooks , wall computers , handhelds , sensors, monitors etc. Cloud computing incorporates software as a service (SaaS) , Web 2.0 and other recent, well-known technology trends, in which the common theme is reliance on the Internet for satisfying the computing needs of the users. In cloud computing, we don't need to have our own resources, but can build applications on others resources too, down-sizing or scaling up according to your needs. Bit-torrent and Skype are successful cloud computing initiatives, but a lot of action is still waiting to happen in this field. In the next few years, cloud computing is going to be very critical, and software as a service will become the more prevalent model. It can be used for scientific applications where there is no outlay for high-end resources, and is even beneficial for colleges in India, which cannot afford expensive hardware. Some major service providers include Amazon, Google, Yahoo, Sales force. The cloud computing architecture can be viewed in two ways front end and back end. The front end which includes a simple PC with internet connection where the user can access his section of data. The back end includes the server and the data center of the cloud service provider

I. INTRODUCTION

Cloud computing includes both a platform and a type of application. A cloud computing platform dynamically provisions, configures, reconfigures, and deprovisions servers as needed. Cloud applications are those that are extended to be accessible through the Internet. These cloud applications use large data centers and powerful, costs servers that host Web applications and Web services. Cloud computing is an emerging approach to shared infrastructure in which large pools of systems are linked together to provide IT services. Cloud Computing will allow corporate data centers to operate more like the Internet by enabling computing across a distributed, globally accessible fabric of resources, rather than on local machines or remote server systems. Organizations can use them as much as they want and as wireless broadband connection options grow, wherever they need them. The key feature of cloud computing is that both the software and the information held in it live on centrally located servers rather than on an end-user's computer. "This means 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."

DEFINITION:

A cloud is a pool of virtualized computer resources. A cloud can:

- Host a variety of different workloads, including batch-style back -end jobs and interactive, user-facing applications
- Allow workloads to be deployed and scaled-out quickly through the rapid provisioning of virtual machines or physical machines
- Support redundant, self-recovering, highly scalable programming models that allow workloads to recover from many unavoidable hardware/software failures
- Monitor resource use in real time to enable rebalancing of allocations when needed

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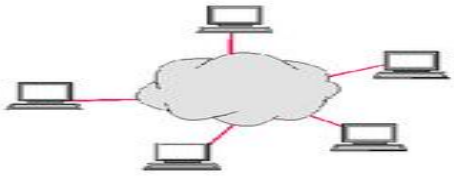

II. PRINCIPLE BEHIND THE COMPUTING

SaaS

Software as a Service is a model of software deployment where an application is hosted as a service provided to customers across the Internet, it delivers a single application through the browser to thousands of customers using a multitenant architecture .On the customer side, it means no upfront investment in servers or software licensing; on the provider side, with just one app to maintainare low compared to conventional hosting. . By eliminating the need to install and run the application on the customer's own computer, SaaS eliminates the customer's burden of software maintenance, ongoing operation, and support. Conversely, customers relinquish control over software versions or changing requirements; moreover, costs to use the service become a continuous expense, rather than a single expense at time of purchase. Using SaaS also can conceivably reduce that up-front expense of software purchases, through less costly, on-demand pricing. SaaS lets software vendors control and limit use, prohibits copies and distribution, and control all derivative versions of their software. This centralized control often allows the vendor to establish an ongoing revenue stream.

The SaaS software vendor may host the application on its own web server, or this function may be handled by a third-party Application Service Provider (ASP). This way, end users may reduce their investment on server hardware too. Salesforce.com is by far the best-known example among enterprise applications, but SaaS is also common for HR apps and has even worked its way up the food chain to ERP, with players such as Workday. Some of the online tool based on SaaS is Google Apps and Zoho Office. SaaS is expected to grow by more than 30 per cent a year and become a $10billion market in another year. India is emerging as the fastest growing SaaS market in the Asia Pacific region with close to half of SaaS revenue coming from the areas of Web conferencing and collaboration. Zoho is one company that has lost no time in establishing its leadership position in the online hosted applications space. Zoho's popular suite of applications has been described by the UK-based weekly newspaper The Economist as "the most comprehensive suite of Web-based programs for small businesses." SaaS applications are generally priced on a per-user basis, sometimes with a relatively small minimum number of users and often with additional fees for extra bandwidth and storage.

WEB 2.0:

The term "**Web 2.0**" describes the changing trends in the use of World_Wide_Web technology and web_design that aim to enhance creativity, communications, secure information sharing, collaboration and functionality of the web. Web 2.0 concepts have led to the development and evolution of web-culture communities and hosted_services, such as social-networking_sites, video sharing sites, wikis, blogs, and folksonomies

UTILITY MODEL:

The term utility computing is acquiring fashion even while cloud is still quite nebulous, the results for utility computing as an effective IT strategy were notably more negative. Only 16.9% of respondents said they had adopted a utility computing service, with another 9.5% saying they would do so this year. That left 73.6% with no plans. And take-up even showed a slight fall from the previous year's results. Only 48% of the sample rated the strategy as effective, with a larger percentage rating it as neutral. That effectiveness score was down from 61.5% a year earlier. Certainly, for as long as IT has appeared as an expense line on corporate accounts, businesses have wished there was a better way of sourcing IT services. They have looked at ways to avoid large, upfront capital expenditure, and complex and time-consuming deployment projects that yielded uncertain results. Above all, corporate executives have searched in vain for an IT delivery model that is dynamic and flexible enough to be easily aligned with their constantly changing business needs. In fact,

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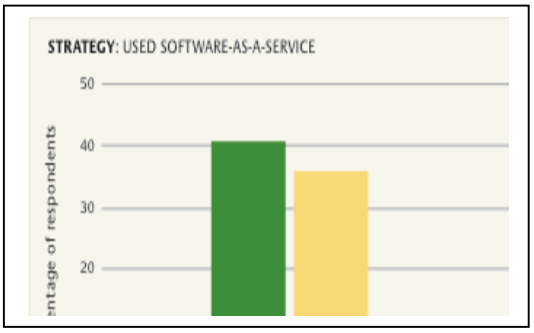
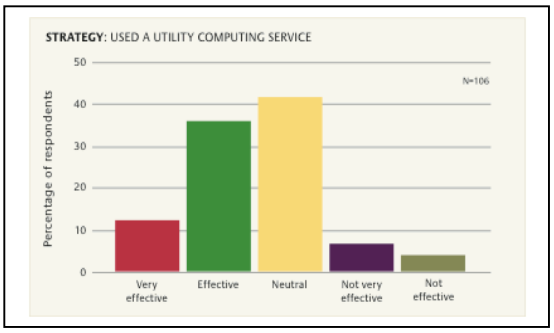
ideally, business would like IT to be available as a pay-as-you-go, on-demand service akin to that provided by the electricity generators and other utility suppliers. This, its proponents claim, is exactly what cloud computing can provide.

"The SaaS platform, with its comparatively short deployment cycle and high-refresh cycle is simply more disposed to a higher level of innovation, and it is more open."





SERVICE PROVIDERS

- **IBM AND GOOGLE:** The two I.T giants IBM and Google are investing in 'cloud computing' to build large data centers which students in the United States universities can tap into over the internet to program and research remotely. Altogether six universities including Carnegie Mellon, Massachusetts Institute of Technology, Stanford University, the University of California, Berkeley, the University of Maryland and the University of Washington will be involved in this venture of Google and IBM. Scientists say setting up and running data centers, and providing the electricity and technical assistance is difficult and expensive. The two companies have committed a total of 30 million dollars over two years for the project. In the corporate market, IBM along with others has built internet services to anticipate and forecast market trends, tailor pricing and optimize procurement and manufacturing. These services use data centers that utilize thousands of processors, store countless libraries of data and engage specialized software to tackle "internet-scale computing challenges".
- **TCS AND YAHOO:** CRL, a wholly-owned subsidiary of Tata Sons Limited, along with Yahoo! supports cloud computing research. EKA, which is one of the fastest supercomputers in the world, would be made available by CRL to the researchers. This partnership brings together Yahoo!'s leadership role in the development of Hadoop and CRL's expertise in high performance computing, and will help bridge the gap between traditional supercomputing and cloud computing research in India. EKA is ranked the fourth fastest supercomputer in the world, with 14,400 processors, 28 terabytes of memory, 140 terabytes of disks and a peak performance of 180 trillion calculations per second (180 teraflops).
- **CLOUD GIANT AMAZON:** Amazon was an early entrant in the market for the latter example of Cloud Computing, and that is a service utility that allows the user to 'switch' on both processing capacity, and storage as required, like any other utility. This is also paid for as a subscription, and new metrics like Giga-Hertz Hours are used for the pricing models. It is at this level that some of the large vendors see the potential for the future of the software (and to a certain extent, hardware) industries. Amazon's Elastic Compute Cloud (EC2) allows the imaging of servers and the use of web-services to provision these images on specified virtual platforms. It currently allows a range of basic, to intermediate, to high-performance spaced platforms and these are priced on an hourly basis. Using the Amazon Simple Storage Service (S3) a complete application environment can be provisioned from the stored images in a short period of time, used for a defined purpose and period, and then decommissioned. In the corporate world, cloud computing has made it possible for small companies to compete on an even footing with competitors many times their size. They can preserve capital by renting IT services instead of investing in hardware and applications or hiring programmers to design custom applications.

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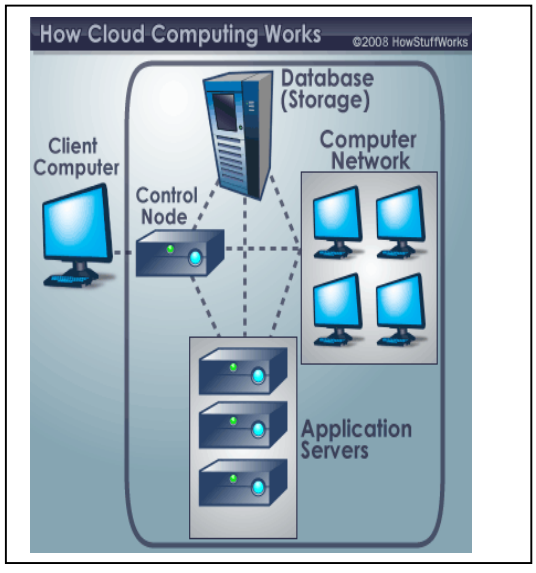
It might seem odd that Amazon, perhaps the world's largest e-commerce merchant with $17 billion in annual revenue, would take out a major position in the cloud computing market, but it's actually a very shrewd move. The company has built up a huge information technology infrastructure over the years, with massive amounts of computing power and digital storage. But by some estimates, the company utilizes just 10 percent of its total capacity much of the time. The reason it needs so much headroom is to handle infrequent periods of peak demand; the rest of the time, the hardware largely sits idle. Amazon jumped into cloud computing with its Amazon EC2 (Elastic Compute Cloud) service in an effort to increase its return on its IT investments by taking advantage of the excess idle time on its servers. Amazon EC2 is based on virtual machine technology, software-based computers that share their host's hardware resources. An Amazon EC2 customer creates and uploads to Amazon's servers something Amazon calls an Amazon Machine Image. This image consists of the operating system and application software the customer needs to run, plus the data associated with it. The customer then orders up whatever number of virtual machines they need for their computing environment.

III. CLOUD COMPUTING ARCHITECTURE

Cloud architecture extends to the client, where web browsers and/or software applications access cloud applications. The majority of cloud computing infrastructure as of 2009 consists of reliable services delivered through data centers and built on servers with different levels of virtualization technologies. The services are accessible anywhere in the world, with *The Cloud* appearing as a single point of access for all the computing needs of consumers. Commercial offerings need to meet the quality of service requirements of customers and typically offer service level agreements. Open standards and open source software are also critical to the growth of cloud computing. 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. The cloud computing system architecture can be divided into 2 sections, the front end and the back end. They connect to each other through a network, usually the Internet.

The front end is the side the computer user, or client, sees. The back end is the "cloud" section of the system. The front end includes the client's computer (or computer network) and the application required to access the cloud computing system. Not all cloud computing systems have the same user interface. Services like Web-based e-mail programs leverage existing Web browsers like Internet Explorer or Fire fox. Other systems have unique applications that provide network access to clients.



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On the back end of the system are the various computers, servers and data storage systems that create the "cloud" of computing services. In theory, a cloud computing system could include practically any computer program you can imagine, from data processing to video games. Usually, each application will have its own dedicated server. A central server administers the system, monitoring traffic and client demands to ensure everything runs smoothly. It follows a set of rules called protocols and uses a special kind of software called middleware. Middleware allows networked computers to communicate with each other. If a cloud computing company has a lot of clients, there's likely to be a high demand for a lot of storage space. Some companies require hundreds of digital storage devices. Cloud computing systems need at least twice the number of storage devices it requires to keep all its clients' information stored. That's because these devices, like all computers, occasionally break down. A cloud computing system must make a copy of all its clients' information and store it on other devices. The copies enable the central server to access backup machines to retrieve data that otherwise would be unreachable. Making copies of data as a backup is called redundancy.

PITFALLS IN CLOUD COMPUTING:

- **BROWSER VULNERABILITIES:** Cloud services are often used and managed with web browsers. Browsers are a major target for hackers; they are the weak point in any security strategy.
- **VULNERABLE APIs:** The employees of an organization have to access and manage the cloud remotely via APIs. These APIs enlarge the attack surface of an organization, since the unnecessary data are the firewall. If an API of a cloud provider has vulnerability, it might expose an organization's data to anyone who gets access to the corresponding exploit.
- **MONOCULTURE:** Large datacenters are like large cornfields. Monocultures are more vulnerable to pests than are smaller units.
- **INTERESTING YARGET FOR HACKERS:** Cloud providers are an interesting target for hackers. Once they are in the datacenter, they have access to not only one but hundreds or even thousands of organizations. The more hackers who attack a datacenter, the more likely it is that they will get in, sooner or later.
- **TERRORIST ATTACK:** Large datacenters are also interesting targets for terrorists. Destroying a big data center that hosts the IT infrastructure of many important companies is probably more "effective" than crushing a skyscraper.

CLOUD COMPUTING APPLICATIONS:

The applications of cloud computing are practically limitless. With the right middleware, a cloud computing system could execute all the programs a normal computer could run. Potentially, everything from generic word processing software to customized computer programs designed for a specific company could work on a cloud computing system.
Here are just a few reasons to rely on another computer system to run programs and store data:

- Clients would be able to access their applications and data from anywhere at any time. They could access the cloud computing system using any computer linked to the Internet. Data wouldn't be confined to a hard drive on one user's computer or even a corporation's internal network.
- It could bring hardware costs down. Cloud computing systems would reduce the need for advanced hardware on the client side. You wouldn't need to buy the fastest computer with the most memory, because the cloud system would take care of those needs for you. Instead, you could buy an inexpensive computer terminal. The terminal could include a monitor, input devices like a keyboard and mouse and just enough processing power to run the middleware necessary to connect to the cloud system.
- Corporations that rely on computers have to make sure they have the right software in place to achieve goals. Cloud computing systems give these organizations company-wide access to computer applications. The companies don't have to buy a set of software or software licenses for every employee. Instead, the company could pay a metered fee to a cloud computing company.

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- Servers and digital storage devices take up space. Some companies rent physical space to store servers and databases because they don't have it available on site. Cloud computing gives these companies the option of storing data on someone else's hardware, removing the need for physical space on the front end.
- Corporations might save money on IT support. Streamlined hardware would, in theory, have fewer problems than a network of heterogeneous machines and operating systems.
- If the cloud computing system's back end is a grid computing system, then the client could take advantage of the entire network's processing power. On a grid computing system, the client could send the calculation to the cloud for processing. Computers on the back end, significantly speeding up the calculation.

IV. CONCLUSION

Cloud computing is the next big wave in computing. It has many benefits, such as better hardware management, since all the computers are the same and run the same hardware. It also provides for better and easier management of data security, since all the data is located on a central server, so administrators can control who has and doesn't have access to the files. There are some down sides as well to cloud computing. Peripherals such as printers or scanners might have issues dealing with the fact that there is no hard drive attached to the physical, local machine. If there are machines a user uses at work that aren't their own for any reason, that require access to particular drivers or programs, it is still a struggle to get this application to know that it should be available to the user. A strong security is concerned with cloud computing as there is chance for hacking the entire data centre results in loss of entire data and miss use of information.

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