DESIGN AND IMPLEMENTATION OF A VIRTUAL COMPUTING ENVIRONMENT IN SCHOOLS AND OFFICES

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Abstract- The issue of mobility of computers and the applications that run on them has become a prevalent issue in modern day computing. The demand for computing anywhere with anything is increasingly high. Users want to be able to access their documents, use their important applications, and even their entire desktops on the go. They want to be able to do these without having to carry their computer systems everywhere with them. Tablets and "super smart-phones" have done a lot to an extent to resolve some of these issues as they are very light and easy to carry around and can carry out a couple of the tasks that the normal computer system should carry. But still these devices are too small (in terms of memory) to be really able to carry the many applications a user needs, or let alone process them. Also because of flexibility users would like to access the same thing with any device, instead of being tied to one device.

Cloud computing and virtualization provide a solution to all of these issues and even more. They provide several consolidation and virtual solutions that help make data recovery and data redundancy easier, maintenance and management of information technology easier, and even reduce information technology costs. Small and medium enterprises recognise that technology is critical for growth, productivity and competitiveness, but high costs, access to scarce skills, and the retention of legacy information technology systems often make it difficult to maximize the return on investment and benefits that modern technology offers. Cloud computing and virtualization offers a solution to this dilemma also. By using software applications accessed over the web, these enterprises can take advantage of functionality that would otherwise only be affordable by large enterprises. These services provided to the small and medium enterprises are provided at a pay-as-you-go basis. Also the enterprises can pay for what they need as the business expands or contracts. Issues such as buying hardware, providing technical support, and recruiting specialist information technology skills are removed, allowing the managers of these establishments to concentrate on sales, growth and profitability. [1]

Keywords-Virtualization, Cloud Computing, Virtual Computing

I. INTRODUCTION

Virtualization can be referred to as an act of creating an abstract version of something be it storage, desktops, servers, or networks. It involves an abstraction layer that abstracts an operating system from its hardware. Virtualization is basically the process of taking advantage of excess processing, memory storage, networking, and capacity to create several artificial environments each having different functions. Virtualization has led to several spin-offs, one of which is cloud computing. Cloud computing can be referred to as network-based services which are provided by virtual hardware, simulated by hypervisors running on the physical servers.Cloud computing and virtualization help arising issues in schools and offices that range from reducing information technology costs to making information technology as mobile as possible.The computing world is rapidly transforming towards developing software for millions to consume as a service, rather than to run on their individual computers. At present, it is common to access content across the Internet independently without reference to the underlying hosting infrastructure. This infrastructure consists of servers that are monitored and maintained around the clock by service providers.

This concept of virtual computing can be likened to how electricity is used in houses via paid meters and also how water is distributed to houses. While owning a computer can be likened to owning your own generator (or any other way of generating your own electricity) or drilling a bore hole in your house to provide water. In the case of database as a service and data centre as a service, small and medium sized organisations now realise that it is cheaper to outsource their data centres and databases. Even some larger organisations are starting to outsource or virtualize their desktop computers for improved security, mobility, maintenance and management. In virtual computing, performance is also closely monitored and therefore relatively consistent. Data and processes are reliable and redundant. And cost of computing is effectively reduced. • A public-cloud delivery

model converts capital expenditure to operational expenditure. This purportedly lowers barriers to entry, as infrastructure is typically provided by a third-party pricing on a utility computing basis is fine-grained, with usage-based options and fewer in-house IT skills are required for implementation. [2]

II. OVERVIEW OF VIRTUALIZATION

Computers are a very important part of our world. They are the most advanced machines in the world providing efficiency, accuracy, speed, and multitasking abilities. They are used in all aspects of life, in homes, in businesses, in schools, in research, in accounting, and as a tool for entertainment. They used for writing (anything from letters and essays to books and journals), analyze information, communication, play games and to surf the Web. The term "virtualization" traces its roots to 1960s mainframes, during which it was a method of logically dividing the mainframes' resources for different applications. Since then, the meaning of the term has evolved. [3] As stated in the previous chapter, virtualization can be referred to as an act of creating an abstract version of something be it storage, desktops, servers, or networks. It involves an abstraction layer that abstracts an operating system from its hardware. Virtualization enables servers to run multiple operating systems and applications, making the infrastructure simpler and more efficient. Applications get deployed faster, performance and availability increase and operations become automated, resulting in IT that's safer, easier to implement and less costly to own and manage. [4]

There are several types of virtualization including application virtualization, storage virtualization, network virtualization, and desktop virtualization.

III. DESKTOP VIRTUALIZATION

There is usually the misconception that desktop virtualization is similar to server virtualization. This idea is wrong. Much like servers are different from desktops, desktop virtualization is different from server virtualization and the reasons and techniques used in server virtualization are not the same as those used in desktop virtualization. However, these two are more similar than other forms of virtualization (like application, network, or storage) and they run on hypervisors, on virtual hosts, in the data centre. Desktop virtualization is software technology that separates the desktop environment and associated application software from the physical client device that is used to access it. Desktop virtualization can be used in conjunction with application virtualization and user profile management systems, now termed "user virtualization", to provide a comprehensive desktop environment management system. [5] Desktop virtualization allows for a flexible and secure backup delivery model that supports better disaster/data recovery since the components of the desktop are saved in the data centre and backed up traditionally. If a user's is lost, the restore is much more straightforward and simple, because he/she has only lost his hardware and not data which is not saved to the hardware but to the data centre, basically all the components will be present at login from another device. This also ensures the safety and integrity of the user’s data because data cannot be retrieved from the lost device.

IV. OVERVIEW OF CLOUD COMPUTING

The term “cloud computing” has even become a marketing nomenclature used to selling hosted services. These services are offered in different forms and models such as software as a service (Saas), desktop as a service (DaaS), infrastructure as a service (IaaS), and platform as a service (PaaS). These being the major models that have been offered, there are many more models offered by organisations or at least talked about in the technology world. They include: network as a service (NaaS), communication as a service (CaaS), anything as a service (XaaS), hardware-as-a-service, strategy-as-a-service, collaboration-as-a-service, business process-as-a-service, database-as-a-service, and everything-as-a-service.

Cloud computing service providers usually offer their services according to fundamental models: Software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS). Other key components in anything as a service (XaaS) are described in a comprehensive taxonomy model published in 2009, such as strategy as a service, collaboration as a service, business process as a service, database as a service, etc. [6]. In 2012, network as a service (NaaS) and communication as a service (CaaS) were officially included by ITU (International Telecommunication Union) as part of the basic cloud computing models, recognised service categories of a telecommunication-centric cloud ecosystem [7].

V. SOFTWARE AS A SERVICE (SAAS)

This is a type of service providing user with required applications for use. SaaS is sometimes referred to as “on-demand software” or “application virtualization” and is usually priced on a pay-per-use basis. The consumer does not manage, maintain or control the underlying cloud infrastructure and platforms that run the applications such as processors, operating systems, RAM, power, and the application resources. These are left to the cloud providers, who bear all the costs and build the infrastructure requirements for the application in their data centres and deliver it to the users as virtualised applications. It eliminates the need to install and run the application on the user’s own computer, which simplifies maintenance, management and support. Software as a

service can also be called applications as a service, but some companies have started to refer to “desktop as a service” as essentially being software as a service since the desktop appears to the user as a software.

Virtualised applications are different from the normal local applications in their scalability– which can be achieved by cloning tasks into multiple virtual machines at run-time to meet changing work demands and using load balancers to distribute the work over the set of virtual machines. This process is invisible to the cloud user, who sees only a single access point. SaaS allows businesses to potentially reduce IT operational costs by outsourcing hardware and software maintenance and support to the cloud provider. One drawback of SaaS is that in some cases user data is stored on the cloud provider’s infrastructure, giving room for unauthorized access to the data. Rather than purchasing servers, storage, operating system software, datacenter space, or network equipment, clients instead subscribe to those resources as a variable-cost service.

VI. CONCLUSION

Cloud resources are usually not only shared by multiple users but are also dynamically re-allocated per demand. This can work for allocating resources to users. Virtual computing allows companies to avoid upfront infrastructure costs, and focus on projects that differentiate their businesses instead of infrastructure. It allows enterprises to get their applications up and running faster, with improved manageability and less maintenance, and enables IT to more rapidly adjust resources to meet fluctuating and unpredictable business demand. In a School environment, it is wonderful for learning resources. The university need not deploy several computers in libraries and other locations to provide applications, internet, etc. Also, every student can have the luxury of owning a virtual system that can be accessed from anywhere.

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