

Cloud Computing (Desktop Virtualization & Thin Client Computing)

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Introduction

'Cloud computing' or 'computing in the clouds' is a metaphor for software and desktop virtualization and is often called thin-client computing (Nastu, 2008). The Cloud is a synonym for the whole Internet. Faculty and students only need to have a computer, a Web browser, and an Internet connection. Software applications and storage are now free. No longer do computer users need to own their own software applications with all of its cost, as well as, continuous update costs. The software is owned and provided by a company. Users' worries about maintaining their documents in fear of loss and destruction are limited due to the storage provided by a company. In most cases, the access to the software applications and storage are at no cost to the user. Advertising pays the costs (Lohr, 2007).

Societal and technological implications are vast (Abelson, Ledeen, & Lewis, 2008, 2-4). Microsoft® Office Live Workspace, Zoho®, and Google™ applications are examples of this shift from the user's computer to the company's online servers. With fiber optic transmission cables, satellite transponders, and super fast computers, servers can be located anywhere. These companies maintain their servers in locations called data farms (Johnson, Levine, & Smith, 2009, 11). These data or server farms can be located anywhere in the world. Some can be located on land, such as Iceland (Beard, 2009). They need two requirements. Servers take a great deal of electricity. The source is geothermal. Servers produce a great deal of heat and need cooling capacity. Iceland and Greenland are known for their cold climates. Google is considering locating data farms on floating barges or ships that can be moved around to avoid inclement weather (Ahmed, 2008). These servers maintain the software applications and the data storage. The user only needs access to them.

Cloud Computing Software Applications

"What are Web-based applications? Simply put, they're programs you access over the Internet. You point your Web browser to the place where the application lives online, and then work with it in the same way you'd work with a program that lives on your computer." (Conner, 2008, p. xiv) There are three online software application suites that are currently prominent - Microsoft Office Live, Zoho, and Google. Each one has its benefits and liabilities. However, the major benefit is not having to own (pay for) the software and storage.

Microsoft Office Live

Microsoft Office Live is located at <http://www.officelive.com>. What is the workspace that Microsoft makes available? "A workspace is an online place where you can save, access, and share documents and files for online collaboration. Use it to group related information for work, school, or personal projects. Online collaboration and sharing is easy – all you need is a person's email address and you can invite them to your workspace. You decide if they can edit or simply review. You can access your workspace from any computer with an Internet connection and a Web browser." (Retrieved February 21, 2009, from <http://workspace.officelive.com/FAQ>) This is a workable definition for desktop virtualization or thin-client computing. Microsoft brings its rich history of Microsoft Office software online while adding the

ability for several users to interact online on the same document at the same time. Microsoft, however, does not provide to businesses all of its software features without an additional cost.

Zoho

Zoho is located at <http://www.zoho.com>. Zoho consists of a variety of applications. Zoho at this website in a FAQ, (Frequently Asked Questions, number three) states its main advantage. “Zoho is bringing together a wide range of online applications making it easier for individuals and businesses to manage all their work while dramatically reducing the cost. But being more productive and saving money is just the beginning of using Zoho. As we continue to integrate the various Zoho services and innovate on new ways of getting things done, we hope that you will find working online not only more rewarding, more collaborative, but more enjoyable. ... While using Zoho your documents and data are securely stored online on our servers and can be accessed from anywhere. This means as long as you have Internet access you can access your Zoho data from any computer and enjoy a productive and convenient working experience wherever you go without the hassle of bringing your computer with you. In addition, Zoho helps people collaborate on projects and share information with a simple mouse click. For example, in Zoho Writer, there are several ways to share documents in private, make them public or even perform collaborative editing in real time. Zoho also offers a very economical approach to getting your work done. While we offer free editions of all our applications, businesses also have access to our business editions at extremely competitive rates.” (Retrieved February 21, 2009, from http://www.zoho.com/zoho_faq.html) Zoho provides additional software components and consultation at extra cost to the user.

Google

Google is located at <http://www.google.com>. Google was developed by Larry Page and Sergey Brin. Their work was a major breakthrough as an innovation in desktop virtualization (Evans, 2004). As free online software applications, Google provides almost the same features as Microsoft Office Live. However, Google’s features are not as extensive as Microsoft’s features (Yegulaip & Krasnoff, 2007). It should be noted that Google is always updating its features.

In *How to Do Everything with Google Tools*, Baker (2008) states: “If you thought Google was just about searches, you are in for an interesting read. Google searches are fundamental to the company, and they do factor into most of their products in one form or another, but there’s so much more to learn and explore. I think the folks at Google take much the same approach to problem-solving that I do: If I want to do x, what do I need to have in place? You’ll find lots of answers to that question in both the full Google Tools products, as well as myriad others in varying stages of development at Google Labs.” (p. xix) Google not only offers a myriad of applications, such as word processing, photo editing, blogging, but it is constantly developing new applications and new versions of its applications. A Google software application is never really finished and is usually listed as a Beta version rather than as a finished product. Thus, Google applications are always improving.

Google Applications are found at <http://docs.google.com>. The heart of Google lies in its search engine, email, and Microsoft-like productivity applications. “Google’s online offerings mean, for example, that you don’t have to install a word processing program on your computer. Instead, you can fire up your Web browser, point it to <http://docs.google.com>, sign up for a free account, and start creating your first document in mere seconds. You don’t have to remember to save your work – Google does that for you automatically – so you can focus on the task at hand.” (Conner, 2008, p. xiv) Indeed, in addition to word processing, there are presentation software and spreadsheet software. This is basically an online office suite of software applications.

Questions

Blown to Bits (<http://www.bitsbook.com/>) is the title of a provocative book by three experts in the field of computers and security. Abelson, Ledeen, and Lewis (2008) wrote about the huge change that the digital explosion is bringing. “The Prometheus myth is about technology. Technology, like fire, is neither good nor bad – its value depends on how we use it. And once we start using a technology, society itself changes. It is never the same again.” (p. 295) “The bits explosion is not over. We are in the middle of it. But we don’t know whether it will be destructive or enlightening. The time for deciding who will control the explosion may soon be past. Bits are still a new phenomenon – a new natural resource whose

regulatory structures and corporate ownership are still up for grabs. The legal and economic decisions being made today, not just about bits but about everything that depends upon bits, will determine how our descendants will lead their lives. The way the bits illuminate or distort the world will shape the future of humanity.” (p. 300)

As more and more user data is stored away from the user’s control (user’s personal computer or external hard drive at the user’s location), the question is whether that data is secure or not. One way to look at it is how secure is the user’s computer and storage onsite? The transmission of data may be threatened. The actual storage of data away from the user is secure with multiple redundancies of storage in server farms. A long-term view takes a negative spin. When all of the world’s data or, at least, a particular user’s data is stored by a company, at what point will the company control, use and charge for the data? Who owns the data? How can the data be used? With so many changes in technology over time, will the user be able to obtain the data in the future?

Conclusion

In spite of serious questions about ‘computing in the clouds’ the user can spend a minimum amount of money for a simple computer, a free Web browser, and an Internet connection. ‘Cloud computing’ (desktop virtualization or thin-client computing) entails a smaller investment than owning a desktop computer system and storage devices, maintaining the software and equipment, and worrying about ‘crashes’ that lead to lost data. Currently for the average faculty member and student, ‘cloud computing’ is the future.

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