Cloud Computing: Should We Use It, Teach It, or Let It Drift Away?

Statement of the Problem

Cloud computing is a dramatic change in the way we store information, run applications, access services and software, and teach information systems. Instead of running applications and storing information on local computers, cloud computing participants access technology from a hosting company. Two of the best-known cloud computing host companies for personal cloud computing are Google (e.g., Google Docs) and Microsoft (e.g., Microsoft's Sky Drive).

Does cloud computing have a place in the IS curriculum? This presentation will address not only basic cloud computing principles, but also how an introductory cloud computing unit can be delivered in the classroom.

Review of the Literature

The term cloud computing was coined in late 2007 and has become a predominant interest because of its flexible dynamic IT infrastructures, quality of service guaranteed computing environments, and configurable software services (Kunze, Tao, Wang, & Von Laszewski, 2008). Organizations can acquire computing platforms or IT infrastructures from computing clouds, and then they can run their applications internally. Therefore, cloud computing allows users the services to access hardware, software, and data resources in an integrated computing platform that is transparent to the end user.

Cloud computing consists of the service applications delivered over the Internet along with the data center hardware and systems software that provide those services (Armbrust et al, 2009, 2010). Kunze and others (2008) generalized cloud computing as "a set of network enabled services, providing scalable, QoS guaranteed, normally personalized, inexpensive computing infrastructures on demand, which could be accessed in a simple and pervasive way" (p. 3). Cloud computing involves:

- Hardware as a Service (HaaS)
- Software as a Service (SaaS)
- Data as a Service (DaaS)

The hardware and software in the data center is referred to as the cloud. A public cloud is available to the general public as "pay-as-you-use-it." A private cloud is internal to the organization's data center and is not available to the general public (Armbrust et al, 2010). Applications software can be scaled down (or up) rapidly, needing to pay-for-use licensing to match the needs of cloud computing.

Three unique aspects of cloud computing include 1) the appearance of infinite computing resources on demand,2) the elimination of up-front commitment by cloud users, and 3)the ability to pay for use of computing resources on a short-term basis as needed and release them

as needed (Armbrust et al, 2009, 2010). Infrastructure software must allow metering and billing to be built in. Hardware systems should be designed at the scale for minimum purchase size; operational costs should match performance and purchase cost in importance, rewarding energy proportionality--putting idle portions of memory, disk, and network into low power mode; processors should work well with VMs; flash memory should be added to memory hierarchy; and LAN switches and WAN routers must improve in bandwidth and cost (Armbrust et al, 2010).

Cloud computing will continue to grow, so computing, storage, and networking must focus on horizontal scalability of virtualized resources rather than on single node performance (Armbrust et al, 2010). Because of the increasing growth and strength of cloud computing, the concept must be taught diligently in the Information Systems curriculum so that graduates in the decision sciences fields will have a complete understanding of the value of this virtual resource.

Strategy for DSI Presentation

This seminar will address the following:

1. Definitions and examples of cloud computing
2. Applications of cloud computing uses in the classroom and in business
3. Obstacles and opportunities for cloud computing
4. Enabling technologies behind cloud computing
5. Assignments that can be used in the classroom using cloud computing

Most Relevant References

(An Entire Bibliography, including Works Cited, will be provided during the session)

Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A., Lee, G., Patterson, D., Rabkin, A., Stoica, I., & Zaharia, M. (2009, February 10). Above the clouds: A Berkeley view of cloud computing. Electrical Engineering and Computer Sciences. Technical Report No. UCB/EECS-2009-28. University of California at Berkeley. Retrieved from http://www.eecs.berkeley.edu/Pubs/TechRpts/2009/EECS-2009-28.html

Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A., Lee, G., Patterson, D., Rabkin, A., Stoica, I., & Zaharia, M. (2010, April). A view of cloud computing. Communications of the ACM, 53(4), 50-58.

eScience Institute. (2011). Understanding Cloud Computing for Research and Teaching. University of Washington. Retrieved from http://escience.washington.edu/get-help-now/understanding-cloud-computing-research-and-teaching

Kunze, M., Tao, J., Wang, L., & Von Laszewski, G. (2008, December 1). Cloud Computing: a Perspective Study, 1-11. Rochester, NY: Service Oriented Cyberinfrastruture Lab, Rochester

Institute of Technology and Eggenstein-Leopoldshafen, Germany: Steinbuch Centre for Computing, Karlsruhe Institute of Technology.

Pang, L. (2009, September-October). Applying Cloud Computing in the Classroom. Retrieved from http://deoracle.org/online-pedagogy/teaching-strategies/applying-cloud-computing.html