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Cloud Computing: Cloud Adoption in Professional Practice

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Abstract: ***Cloud computing creates new opportunities in the era of technological advancement specifically to Malaysia. This paper will present and discuss an overview of cloud computing and how the implementation of cloud computing impact an organization and an industries. There are many sectors can get the benefits when adopting the cloud computing services, including education, healthcare, agriculture, tourism, banking, and the automotive industry. In the paper, we briefly highlight certain industry which cloud adoption can significantly enhance system efficiency, effectiveness, and reliability.***

Keywords: cloud computing, professional, cloud adoption, healthcare, automotive

1. Introduction

Over the years, there have been many ways to store programs and data. A very early memory may have been the use of tape cassette. Although they were slow, they allowed users to load and save programs and data to and from their computer. The technology evolved to a faster and more efficient way, from floppy disks to CDs to USB flash drives proved popular ways to back-up or port data. However, without the physical portable storage media in hand, their programs or data are put out of reach.

Instead of having to store information on the portable storage media, the programs and data can be kept remotely and store over the Internet. Cloud computing takes the emphasis away from local computers and delivers computing resources over the Internet. With cloud computing, users are seeing programs and data being managed and provided as a service over the Internet. This differs from the traditional computing because users do not need to rely on portable storage media [1].

Some users may not realize that they have been using the cloud computing service for many years. When users store their photos online instead of on their home computer, or use webmail or a social networking site, they are actually using a cloud computing service [2].

2. How Cloud Computing Works?

Cloud computing, as the name implies, is the delivery of computing services over the Internet. It allows individuals and businesses to use software and hardware that are managed by third parties at remote locations. Few examples of cloud services include online file storage, social networking sites, webmail, and online business applications. Figure 1 below shows typical cloud computing system. Access to information and computer resources is made possible from anywhere that a network connection is available. Cloud computing provides a shared pool of resources, including data storage space, networks, computer processing power, and specialized corporate and user applications. This kind of services ensures the availability of data and information which ease users to access to their information on the go [2].

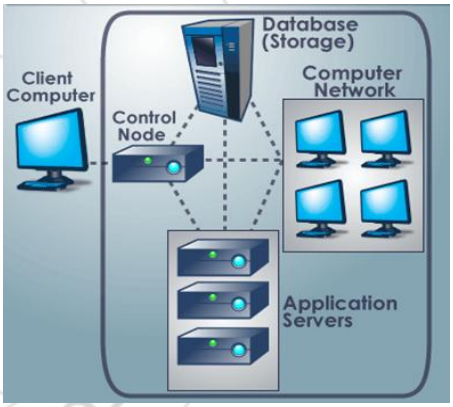

Figure 1: Cloud computing system.

Take for instance, suppose an executive at a large company is responsible in making sure that all of employees have the right hardware and software they need in order to do their jobs. One of the solutions he could do is to buy computers. Unfortunately buying computers for everyone is in fact not enough and just not practical. Legally the company also has to purchase software or software licenses to give employees the tools they require. Whenever a new employee is hired, the company has to buy more software or to at least make sure the current software license allows another user.

Presently, there may be an alternative. Instead of installing a suite of software for each computer, the task is getting easier. The company only has to load one application which allows workers to log into a Web-based service which hosts all the programs the user would need for his or her job. This is achieved with the aid of remote machines. The remote machines owned by another company would run everything from Microsoft e-mail Outlook to word processing to complex data analysis programs.

The explicit benefit is that, in a cloud computing system, local computers no longer have to do all the heavy task when it comes to running applications. The network of computers that make up the cloud handles them instead. This in turn will decrease hardware and software demands on the user's side. The only thing the user's computer needs to be able to run is the cloud computing systems interface software. Once the interface software is installed, the cloud's network will take care of the rest. Maybe many of us do not realize that all this while we have already experienced using some form of cloud computing in our routine works. For instance an e-mail account with a Web-based e-mail service like Hotmail, Yahoo! Mail or Gmail. All of these web-based services are the examples of cloud computing services. Instead of running an e-mail program on the user's computer, the user can just log in to a Web e-mail account remotely. The software and storage for user account is on the service's computer cloud [3].

3. Impact on IT Organizations and Staffing.

The shift to cloud solutions opens up new opportunities for IT organizations as well as the IT professionals. In recent research [4] in November 2012, commissioned by Microsoft, which examines the impact cloud computing will have on IT employment around the world. It was found that cloud computing will change the fundamental relationship between the supported business and the IT organization.

The main benefit of cloud computing is that it releases up resources for enterprises or organizations to use in other ways and at the same time reduces the cost of many IT functions. From the research [4] identified a broad business value of increased revenue from the IT innovation enabled by cloud of up to $1.1 trillion a year by 2015 and also estimated that leveraging public and private IT cloud services might generate a capacity to increase overall employment by nearly 14 million jobs worldwide by 2015.

Cloud computing has a high demand by many organizations as well as end users since its first announcement. It was found that nearly every IT organization is seeking some type of cloud-enabling capability, however, IT hiring manager reported that the biggest reason they fail to fill open requisitions for cloud-related IT jobs is the candidates' lack of sufficient experience, training, or certification. It is not astonishment for the reason being cloud computing can be considered new emerging area. For cloud computing, the availability of skilled IT workers will be a persistent and pervasive challenge. In general, IT professionals should prepare for the multitude and mass of cloud environments in which they might be working with as new paths are presenting themselves and options abound [5].

Whereas, in another research implies that the market for cloud computing in Asia Pacific exclusive of Japan had already exceeded US$1.1 billion in 2010. Market like Australia nowadays lead the entire Asia Pacific region in this trend of cloud computing. In the long run, it is believed that there will be three main implications pertaining to cloud computing [6]:

1. It reduces the entry barriers for new companies who want to offer undeniable services, thus accelerates innovation in ICT industry to the next level of technological advancement.
2. It structures up the ICT industry over time that we will be able to see a greater participation in the enterprise market by large consumer Internet companies such as Amazon, Google, Apple, and Facebook.
3. The area of collaboration will show various convergences of big names including social networking, unified communications, video and mobility. They will be the biggest benefactor of all.

4. Case Study: Cloud Implementation in Malaysia.

In Malaysia, deploying cloud-based ICT solution has become one of the most important trends and is expected to grow from US$43 million in 2012 to about US$900 million by 2020. Malaysian government cloud stakeholders as well as public and private institutes have recently initiated efforts to promote adoption and implementation of cloud services in government organization and small and medium enterprises (SMEs) [7].

Figure 2: VADS Cloud Services

VADS Cloud Services (Figure 2) is a cloud computing technology developed by Malaysian Institute of Microelectronic Systems (MIMOS) in collaboration with VADS Bhd, a wholly-owned unit of Telekom Malaysia Bhd (TM). It aims to offer cloud services for SMEs in Malaysia and also to substantiate its expertise in offering Data Centre and Warehousing Facilities including network, security, connectivity, facility, location, tele-housing, managed services, etc. [8]. The implementation of cloud ready infrastructure and innovative solutions will simplify and enhance business operations by making the infrastructure fully automated in order to improve user experience and control. The deployment will also include Backup-as-a-Service and Disaster Recovery-as-a-Service to ensure data protection and business continuity [9]. These services open new market opportunities of more than RM120 million with 20% compounded growth year on year [8] and expected to grow up to RM230 million by 2015 [10].

In a similar move, IBM Malaysia recently announced the development of a nationwide cloud healthcare infrastructure for KPJ Healthcare Berhad, a leading private healthcare provider, to provide seamless healthcare services to more than 2.5 million patients per year across more than 20

hospitals in Malaysia and 4 overseas hospitals along with an aged care facility. KPJ Healthcare engaged IBM to consolidate and centralize its computing infrastructure on a cloud. The implementation of cloud-ready, secured infrastructure that supports integration and collaboration among the network of hospitals, has enabled KPJ Healthcare to provide better services to the patients and their families and able to respond to patients' needs faster and in a more effective manner. The shift to the cloud infrastructure helps KPJ Healthcare to operate at a reduced cost and with a greater efficiency, reliability and flexibility [11].

5. How Does Cloud Computing Enhance and Help Professional Practice?

Although cloud adoption growth is fast in less regulated sectors, it's very slow in heavily regulated ones such as financial services. The potential for cloud adoption is applicable to a wide range of domains, including education, healthcare, agriculture, tourism, banking, and the automotive industry [7].

5.1 Healthcare

Healthcare is one sector in which cloud adoption can significantly enhance system efficiency, effectiveness, and reliability. Most healthcare systems still rely on paper medical records. Information that is digitized is typically not portable, restraining information sharing amongst the different healthcare actors (medical practices, hospitals, research facilities, etc.). Cloud computing provides an infrastructure that allows hospitals, medical practices, insurance companies and research facilities to use improved computing resources at lower initial capital costs [12]. Figure 3 illustrates an exemplary of cloud-based healthcare ecosystem. The cloud computing can be used to enhance quality of life by incorporating cloud with transportation, medical, and mobile computing sectors to deliver better patient services [7] and help to ensure seamless, personalized healthcare anywhere in the world, through ubiquitous and secure data sharing [13].

eKlinik, a service by iMeus Sdn Bhd which is an MSC company, is a SaaS cloud-based healthcare system, aims to deliver real-time healthcare information to patients, doctors, and hospitals in Malaysia nationwide. It offers cloud based Electronic Medical Records system whereby hospitals do not need to install any software and just access the system via Internet. Some initiative of adopting cloud computing in healthcare industry is to share the medical history across hospitals around the world. Effective cloud-adopted system can allow any hospitals from different places to access patient's medical records and insurance details in case of medical emergency. Thus, integration of medical services using futuristic cloud-adopted healthcare platform can refine efficiency, quality, accessibility, and fairness of healthcare delivery regardless of geographical limitations.

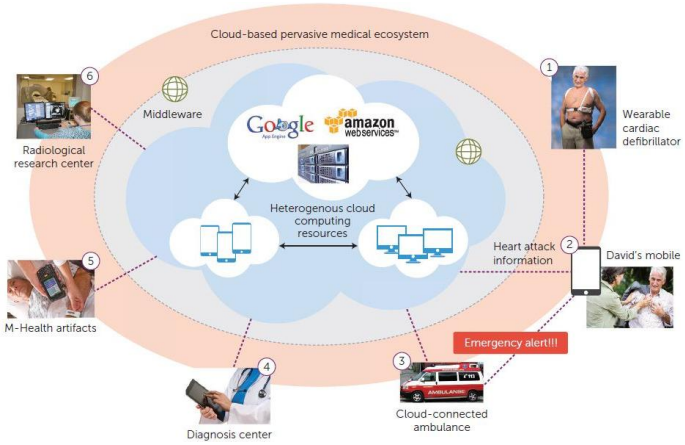

Figure 3: An exemplary cloud-based pervasive healthcare system.

5.2 Automotive

Another promising industry for cloud adoption is automotive. More and more automotive companies are using the cloud to achieve benefits throughout the value chain, such as faster time to market, more flexible collaboration and data sharing. Employing clouds and vehicular clouds in developing highly standard complex design, manufacturing, and testing systems and inventing new intelligent transportation systems and in-vehicle infotainment can significantly boost safety and enhance the passenger's experience, leading to growth in market share. Some of phases with potential cloud adoption in automotive industry are [14]:

1. Design
2. Supply
3. Assembly
4. Retail
5. Aftermarket Services

1. **Design**: The opportunities for cloud computing in design include Cloud-enabled global product development, an integrated product data collection hosted in the cloud, and cloud-based project management applications. The ability of cloud to be scalable and has massive processing power aids in supporting analytics that help improve product quality including facilitating the design of the programmable, autonomous car of the future. It serves as the backbone for operations, helping the company work smarter and faster, starting from the design studio to the factory and lastly to the showroom.

2. **Supply**: Cloud computing can give advantage of opening up opportunities for faster and seamless collaboration across automotive supplier networks worldwide. This in turn helps to ensure efficient and responsive product development. Further, it also allows for secure, more integrated, and visible order management and shipping of equipment parts, which will definitely able to help the

company better serve the fast growing international markets and customers while reducing inventory and costs.

3. **Assembly**: While enhancing analytical and reporting capabilities for operations and product performance, cloud computing also improves synchronization between manufacturing and business systems, making them more interoperable. The load balancing between assembly plants, real time analytics of manufacturing data, as well as feedback to a plant network are all taken care by cloud technology. In this sense, the company can benefit from improved communication, efficiency, globalization and standardization.

4. **Retail**: Cloud computing facilitates detailed consumer insights through cloud-based social media analytics and real-time monitoring of consumer behavior at the retail level. It also supports advanced dealer management systems (DMS), automated vehicle servicing, faster and more effective management of parts ordering, and enhanced dealer training. In this manner, the integrated data warehouse that contains existing commercial data in transaction systems enables relationships between the company, its local dealers and its customers to be managed in a systematic way. This in turn enables drivers to register vehicle information such as actual mileage and create a driver profile, and also provides them with a reference for scheduled maintenance dates and predicted parts replacement.

5. **Aftermarket services**: Aftermarket services in automotive have a big impact to the company. The applications for cloud technologies such as advanced connected vehicle solutions and next generation infotainment products and services enable customers to keep themselves updated to information like proactive remote fault discovery and maintenance, and effective recall and parts inventory management and services. The customers will be able to connect personal devices such as smartphones, laptops and tablets to high speed wireless internet on the go. Meanwhile, the built-in 4G LTE connection will also allow vehicles to be updated with the latest software and mobile apps.

To date, Volvo Car Group's cloud solution offers "total connectivity". In February 2014, Volvo Car Group launched Sensus Connect, an updated onboard infotainment and navigation solution designed to offer a fully connected in-car experience. The cloud-based service allows drivers to find and pay for parking from their car, discover new restaurants at their destination, stream their favorite music seamlessly, and much more. The solution enables tens of thousands of radio stations to be enjoyed in-car, and its navigation system allows the driver to set destinations through their mobile device and get information about their surroundings through Wikipedia. Volvo developed Sensus Connect with partners including Ericsson, Pandora, HERE, Yelp, Glympse and parking service providers [15].

6. Conclusion

To conclude, the cloud computing has reached a maturity stage whereby most of the main issues with cloud computing have been addressed that leads it into a productive phase and become interesting for full commercial exploitation. Bear in mind that this however does not mean all the problems have been solved, only that the risks can be tolerated to a certain degree as cloud computing is still as much a research topic and yet a market offering.

References

[1] Crookes, D, Cloud computing in easy steps, Leamington Spa, United Kingdom, 2012.
[2] Office of the Privacy Commissioner of Canada, "Introduction to Cloud Computing," Fact Sheet, Office of the Privacy Commissioner of Canada, 2011.
[3] Pankaj Sareen, "Cloud Computing: Types, Architecture, Applications, Concerns, Virtualization and Role of IT Governance in Cloud," Journal of International Journal of Advanced Research in Computer Science and Software Engineering, 3 (3), pp. 533-538, 2013.
[4] Cushing Anderson, John F. Gantz, "Climate Change: Cloud's Impact on IT Organizations and Staffing," White Paper, IDC Information and Data, 2012.
[5] Microsoft Learning, "Cloud Computing: What IT Professionals Need to Know," White Paper, Microsoft Corporation, 2011.
[6] Manoj Menon, "Don't Underestimate Cloud Computing Impact," Mega Trend 2020, The Edge Malaysia, 2011.
[7] Saeid Abolfazli, Zohreh Sanaei, Ali Tabassi, Steven Rosen, Abdullah Gani, Samee U. Khan, "Cloud Adoption in Malaysia: Trends, Opportunities, and Challenges," IEEE Cloud Computing, IEEE Computer Society, 2015.
[8] MIMOS National R&D Centre in ICT, "VADS Cloud Services," April 26, 2012. [Online]. Available: http://www.mimos.my/commercial-applications/vads-cloud-services/. [Accessed: April 2, 2015].
[9] TM Berhad, "VADS Launches Malaysia's First Virtual Private Cloud," June 6, 2014. [Online]. Available: https://www.tm.com.my/AboutTM/NewsRelease/Pages/VADS-LAUNCHES-MALAYSIA%E2%80%99S-FIRST-VIRTUAL-PRIVATE-CLOUD.aspx. [Accessed: April 2, 2015].
[10] Kamarul Yunus, "VADS Looks to the Clouds," New Straits Times, Kuala Lumpur, pp. B1,4, 2011.
[11] IBM News Room, "IBM and KPJ Healthcare Berhad Build Nationwide Cloud Infrastructure for Improved Medical Services," May 12, 2014. [Online]. Available: http://www-03.ibm.com/press/us/en/pressrelease/43896.wss. [Accessed: April 18, 2015].
[12] Cloud Standards Customer Council, "Impact of Cloud Computing on Healthcare," White Paper, Cloud Standards Customer Council, 2012.
[13] Mark Grindle, Jitendra Kavathekar, Dadong Wan, "A new era for the healthcare industry; Cloud computing changes the game," Accenture's report, 2013.
[14] Martin W. Glowik, Luca Mentuccia, Marcello Tamietti, "A new era for the automotive industry; How cloud computing will enable automotive companies to change the game," Accenture's report, 2014.
[15] Volvo Car Group, "Volvo Cars' cloud solution offers total connectivity and added functionality," Feb. 24,

2014. [Online]. Available: https://www.media.volvocars.com/global/en-gb/media/pressreleases/138785/volvo-cars-cloudsolution-offers-total-connectivity-andadded-functionality. [Accessed: April 18, 2015].

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