**MIS 310 Week 4 Homework (30 points)** Name: Megan Leonard

You will not be given credit for answers that are copies or near verbatim transcripts – please use your own words and document sources where appropriate using proper APA guidelines. Apply the principles learned in this chapter (chapter 4) or previous chapters to answer the questions for this assignment.

**Chapter 4 Learning Outcomes**

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| * Identify and briefly describe three network topologies and four different network types, including the uses and limitations of each. * Identify and briefly discuss several types of both guided and wireless communications. * Identify several network hardware devices and define their functions. * Briefly describe how the Internet and the Web work, including various methods for connecting to the Internet. * Outline the process and tools used in developing Web content and applications. * List and briefly describe several Internet and Web applications. * Explain how intranets and extranets use Internet technologies, and describe how the two differ. * Define what is meant by the Internet of Things (IoT), and explain how it works. * Identify and briefly, discuss several practical applications of the Internet of Things (IoT). * Categorize and summarize several potential issues and barriers associated with the expansion of the Internet of Things (IoT). * Discuss how cloud computing can increase the speed and reduce the costs of new product and service launches. * Summarize three common problems organizations encounter in moving to the cloud. * Discuss the pros and cons of private and hybrid cloud computing compared to public cloud computing. |

**Week 4 Review Questions (10 points)**

Answer the following questions in one or more paragraphs using proper APA format as required**:**

1. [2 points] What is meant by client/server architecture? Describe how this architecture works.

Client/server architecture means that there are computers that can be accessed by all of the other computers on the network. These are set up to run the database, communications, and execution for the server.

1. [2 points] Define the term “channel bandwidth.” Why is this an important characteristic of a communication channel?

Channel bandwidth is the rate that data is exchanged this is important as the speed of the communication channels depends on the size of the bandwidth and how fast the data is processed.

1. [2 points] What is XML, and how is it used?

XML is a markup language that is used to transport and store data for web documents and the web.

1. [2 points] What is the Internet of Things (IoT), and how is it used?

The internet of things is a network created of physical objects that contain sensors, processors, software, and network connectivity capabilities. They can collect data with the sensors then exchange the data with the manufacturer or the operators.

1. [2 points] What is cloud computing? Identify three approaches to deploying cloud computing.

Cloud computing is when the software and storage are provided as an internet service that people can access using a web browser. Three approaches to cloud computing are public, private, and hybrid. The public cloud computing is owned by a service provider organization and can be used for a subscription by anyone. Private is a single tenant cloud that organizations use to make sure their data is secure and can not be accesses by anyone else. Hybrid is a mixture of both public and private to help with agility and security.

**Week 4 Critical Thinking Exercise (10 points)**

Read the following and answer the questions in one or more paragraphs using proper APA format as required**:**

***Manufacturer Weighs Converting to Internet of Things***

*You are a member of the plant information systems group for a small manufacturer of all-natural ingredient cosmetics. Your firm promotes itself as adhering to the highest standards of compliance and quality. Manufacturing is rigorously monitored via sensors and computer controls throughout the entire process, and automated temperature controls ensure complete stability in the manufacturing environment. Sensor tracking is performed from the moment that raw materials enter your facility, throughout the manufacturing process, packaging, and on to distribution. The sensors and computer controls were installed when the plant was built in the 1990s and use proprietary communications protocols and are not Internet enabled. Data from these sensors is monitored by a group of three technicians in the computer control room. Twelve workers are required to staff the control room 24/7, including weekends and most holidays.*

*Your company has just purchased a plant previously owned by one of your competitors in a nearby state. Your group has been asked to look at the feasibility of upgrading the sensors used in both plants to Internet-enabled sensors connected to the Internet of Things. This would make it possible for technicians in one control room to monitor the operation of both plants. Plant staffing could be reduced by 12 workers saving $1.2 million in labor expenses per year. It is estimated that the cost of replacing the existing sensors and converting to the Internet of Things is in the vicinity of $1.5 million.*

1. [2 points] Why is it necessary to replace the existing sensors to implement an IoT network?

The sensors that the company originally had could not connect to the internet so they would need to be replaced since the IoT network uses the internet.

1. [2 points] What additional benefits may arise from converting the plants to the Internet of Things?

Some benefits are that they could monitor both events without having to be on site, they could save money by not having to hire another monitoring group, and they would be able to use the internet.

1. [3 points] What new risks are raised by placing the new system of sensors on the Internet of Things?

The risks would be that it would be easier to be hacked as it can be accessed through the internet, they could also loose older data if they tried to transfer it to the new system.

1. [3 points] What actions could be taken to reduce these risks?

They could reduce the risk by setting up a security team to make sure their system is secure and make sure everything is backed up before moving.

**Week 4 Case Study (10 points)**

Read the following and answer the questions in one or more paragraphs using proper APA format as required**:**

***Cloud Helps Fight Cancer***

*Each minute one person in the United States dies from cancer—over half a million deaths per year. Thousands of scientists and physicians are working around the clock to fight cancer where it starts—in our DNA.*

*DNA is a molecule present in our cells that carries most of the genetic instructions used in the development, functioning, and reproduction of all known living organisms.**The information in DNA is stored as a code made up of four chemical bases adenine (A), guanine (G), cytosine (C), and thymine (T). Human DNA consists of about 3 billion bases, and more than 99 percent of those bases are the same in all people. The complete set of DNA instructions is called your genome, and it comes packaged into two sets of chromosomes, one set from your mother and one set from your father. Sometimes those instructions are miscoded or misread, which can cause cells to malfunction and grow out of control—resulting in cancer.*

*Doctors now routinely use patient genetic data along with personal data and health factors to design highly personalized treatments for cancer patients. However, genome sequencing is a highly complex effort—it takes about 100 gigabytes of data to represent just a single human genome. Only a few years ago, it was not even feasible to analyze an entire human genome. The Human Genome Project (HGP) was the international, collaborative research program whose goal was the complete mapping and understanding of all the genes of human beings. The HGP took over 15 years and cost in the neighborhood of $3 billion, but the result was the ability to read the complete genetic blueprint for humans.*

*It takes a computer with powerful processing power and prodigious amounts of storage capacity to process all the patient data required to sequence their genome. Most researchers simply do not have the in-house computing facilities equal to the challenge. As a result, they turn to cloud computing solutions, such as the Amazon Web Services public cloud system. Thanks to cloud computing and other technical advances, sequencing of a human genome can now be done in about 40 hours at a cost of under $5000.*

*Researchers at Nationwide Children’s Hospital in Columbus, Ohio invented Churchill, a software application that analyzes gene sequences very efficiently. Using cloud computing and this new algorithm, researchers at the hospital are now able to analyze a thousand individual genomes over the period of a week. Not only does this technology enable the hospital to help individual patients, it also helps large-scale research efforts exploring the genetic mutations that cause diseases.*

*Using the cloud also enables doctors and researchers worldwide to share information and collaborate more easily. The Cancer Genome Atlas (TCGA) is a research program supported by the National Cancer Institute and the National Human Genome Research Institute, whose goal is to identify genomic changes in more than 20 different types of human cancer. TCGA researchers compare the DNA samples of normal tissue with cancer tissue taken from the same patient to identify changes specific to that cancer. The researchers hope to analyze hundreds of samples for each type of cancer from many different patients to better understand what makes one cancer different from another cancer. This is critical because two patients with the same type of cancer can experience very different outcomes and respond very differently to the same treatment. Researchers hope to develop more effective, individualized treatments for each patient by connecting specific genomic changes with specific outcomes.*

1. What advantages does cloud computing offer physicians and researchers in their fight against cancer?

Cloud computing helps give doctors a way of storing the information of a person in a easier to follow way and helps with comparing the information they need to from the DNA to the health records. The data as stated for the genome takes a lot of data to fully represent it so the cloud computing helps give them the storage to be able to do this.

1. Estimate the amount of data required to analyze the human genome of 100 patients for each of 20 different types of cancer.

If a single genome is represented with 100 gigabytes, then for 100 patients it would be 10,000 gigabytes adding to these 20 different types of data per patient, we would get 200000 gigabytes needed to analyze all the data.

1. Physicians must abide by HIPAA regulations when transmitting data back and forth to the cloud. The penalties for noncompliance are based on the level of negligence and can range from $100 to $50,000 per violation (or per record). Violations can also carry criminal charges, resulting in jail time. What measures can be taken when using cloud computing to ensure that patient confidentiality will not be violated?

They could use hybrid cloud computing so they can has the speed that comes from public while having the security the comes from private cloud computing as well as making it only accessible to those who need to use the information.

SOURCES: Gaudin, Sharon, “How The Cloud Helps Fight Cancer,” Computerworld, May 20, 2015, www.computerworld.com/article/2923753/cloud-computing/how-the-cloud-helps-fight-cancer.html; “Deoxyribonucleic Acid Fact Sheet,” www.genome.gov/25520880, accessed December 7, 2015; “Cancer Genomics What Does It Mean to You?,” The Cancer Genome Atlas, http//cancergenome.nih.gov/PublishedContent/Files/pdfs/1.1.0\_CancerGenomics\_TCGA-Genomics-Brochure-508.pdf; “TCGA on AWS,” http//aws.amazon.com/public-data-sets/tcga, accessed December 7, 2015; “An Overview of the Human Genome Project,” National Human Genome Research Institute, www.genome.gov/12011238, accessed December 10, 2015.