Assignment 2

Some rules about the submission:

- Submit your work via email to Yanbing, our TA – (YAX14@pitt.edu) and cc me (chatree@pitt.edu)
- Put "CS1699: Assignment 2" in the subject line

1. Describe briefly what is the 4th paradigm raised by Jim Gray and why or why not you believe him. (10 points)
2. What are the 5 V's related to Big Data? Please describe briefly the meaning of each V. (10 points)
3. Cloud computing is dominating everywhere, explain
    a. The motives for enterprises to move their resource to cloud (5 points)
    b. The motives for customers to use cloud (5 points)

4. A company needs 500 servers with 100 petabytes data storage. In each situation below, suggest the option(s) for the company to deploy among: Data Center, Public, Private, or Hybridge Cloud, along with the reason why.
    a. The company needs a full control of the data and equipment. Security is the big concern.
    b. The company's needs will change rapidly since the market is so volatile.
    c. The company's IT department wants to control over these IT resources and they expect to shuffle the resources among different departments quite often.
    d. The company need to put some servers in a secure environment and some in the public domain.

5. Draw the K-ary fat tree architecture where K=6
6. Compute PUE and DCie for the DC which has power usage detailed below
    a. 60,000 kW to power all the servers
    b. 10,000 kW to power all networking gears
    c. 5,000 kW for all lighting
    d. 5,000 kW for the air condition in the administrator room
    e. 20,000 kW for cooling system

Use the reference below to find out which ones considered IT load or not

http://www.missioncriticalmagazine.com/ext/resources/whitepapers/Guidance-for-Calculation-of-PUE-in-Data-Centers-Schneider-Electric.pdf

7. What are the ideal numbers for CUE and WUE? Is it possible to achieve that?
8. From the four Server Virtualization Techniques learn from the class, answer below which technique is best for each situation
    a. Need a lightweight virtualization that can populate several virtualized machines with the same OS as the host's.
    b. Performance is the main concern and need to install several VMs with OSs as is.
    c. Need to install several VMs with new OSs that are not yet supported by VMM.
    d. Need an efficient virtualization technique that utilizes the new CPU architecture
9. Describe how the Shadow Page Table works
10. Why do need Network Virtualization? Why what VLAN provides are not good enough?