Jay Kalyanbhai Savani
CWID – 20009207
CS 524 Intro to Cloud Computing
Homework 1

1. Using the formulae for the first software business model, find the year where the cumulative support expense equals that of the initial licensing fee p, where p = $12,000 per user, and c = 0.40. In how many years will the initial cost of software become 5% of the overall expenditure?

Ans: CSE = P*C*M.

P= Initial Licensing Fee/User C= Support ratio Coefficient M = Number of years

CSE=P, P= P*C*M

CM=1, → M=1/C, → M=1/0.40, → M=2.5 Years

The initial cost of software is 5% I*C = N*P

N = Number of Employees P = Initial Licensing fees per user Overall Expenditure (OE)

OE = N*P(1+M*C)

IC = 5% of E

IC = 0.05*N*P(1+M*0.040)

= 0.05*(1+M*0.40) =1

= 1+(M*0.40)

= 1/0.05

M*0.40 = 1/0.05 = 1

M*0.40 = 20-1

M=19/0.40

M=47.5

The initial license charge would be equal to 2.5 years' worth of cumulative support costs.

Software's initial cost would represent 5% of overall expenditure: 47.5 years.

2. Give three examples of each, SaaS, PaaS, and IaaS.

Ans:

PaaS AWS Elastic Beanstalk, Google App Engine, and Adobe Commerce

SaaS Gmail, Slack, and Microsoft Office 365

IaaS Amazon Web Services, Microsoft Azure, and Google Compute Engine

Reference - https://www.zendesk.com/blog/what-is-paas/

3. **In the definition of Hybrid Cloud, the term "Cloud bursting" is mentioned. Search the Web for its definitions. Do these definitions agree? If so, provide what you think is the best definition (you can rephrase it as you see fit). If not, explain the differences between the definitions.**

Ans: The best definition is a hybrid cloud architecture where an application runs primarily on a private cloud but temporarily expands capacity to a public cloud as needed.

In my view, they are related to each other.

By permitting data and applications to be transferred between them, a hybrid cloud is a computer environment that combines a public cloud and a private cloud. By using this strategy, businesses may benefit from the scalability and cost advantages of public cloud services while maintaining sensitive data in a private, safe setting. The objective of a hybrid cloud is to offer the ideal blend of resources, skills, and affordability to satisfy the unique demands of an enterprise.

Reference - https://pages.awscloud.com/hybrid-cloud-outposts.html

4. What are the essential differences between the public and private cloud that have made CIOs worry about the legal consequences of Shadow IT? Read the original text of the US Government acts mentioned in the text (HIPAA and SOX) and summarize each in one paragraph.

Ans:

What is a public cloud?

A public cloud is an outward-facing cloud platform that's managed by a data company but primarily intended for public use by customers. It tends to be free or low-cost to use and is designed to hold and transfer a variety of data files. This type of cloud is focused on the data types used and shared by most consumers, like photos or documents. It can generally be accessed at any time and in any place.

What is a private cloud?

A private cloud is an internal cloud platform that's specifically designed to be used by the employees (and sometimes business partners, etc.) of an organization. The organization wants the syncing, collaboration, and storage benefits of the cloud, but they need extra security for sensitive information or other features that public clouds don't possess. The solution is to create their cloud or have one hosted by a third-party provider.

What are some examples of public versus private clouds?

Public clouds: If you've used iCloud, Dropbox, Microsoft OneDrive, or Google Drive, then you've used a public cloud. These are easily recognized and widely available.

Private clouds: Private clouds are often used by government agencies and financial institutions, which have a keen interest in making their data accessible internally but locked tight from outside theft attempts.

These are the main variations between the two definitions:

1. A private cloud is for exclusive usage, whereas a public cloud is for open use.

2. A private cloud may be run and owned by a cloud provider OR the single entity employing it, as opposed to a public cloud, which is managed by a cloud provider.

HIPAA

The Health Insurance Portability and Accountability Act sets the bar for safeguarding sensitive patient data (HIPAA). HIPAA promotes the privacy and security of individual medical data. If your business exchanges health information, you understand how crucial it is to protect that information from accidental disclosure or malicious attack. With the passage of the HITECH act, which is seen as a development in healthcare IT and provides the groundwork for the widespread use of electronic health records, HIPAA restrictions have grown increasingly strict over time.

SOX

Accounting firms that work with publicly traded corporations must make sure their IT infrastructure complies with SOX regulations. Publicly traded firms are required to abide by the accounting and compliance framework established by the Sarbanes-Oxley Act (SOX). A secure computer system that permits the private conveyance of financial information securely to responsible parties is what is referred to as a SOX-compliant infrastructure in terms of technology (i.e., Company officers). This infrastructure's development must satisfy a third-party SOX auditor's standard. A company's technology is frequently responsible for safeguarding against revenue deception.

References - https://www.itbriefcase.net/private-cloud-vs-public-cloud-what-is-the-difference

References - https://drata.com/blog/soc2-and-hipaa

5. Familiarize yourself with the description of Amazon Elastic Cloud Computing (http://aws.amazon.com/ec2/). What kind of a service model does it provide (i.e., SaaS, PaaS, IaaS, or a combination of these)? Please list the features that support your answer.

Ans: Amazon Web Services (AWS) Infrastructure as a Service (IaaS) offering is called Amazon Elastic Cloud Computing (EC2) (AWS).

Features that back up this response:

- The virtualized computing resources offered by EC2 include virtual machines (instances) with different CPU, memory, storage, and network configurations.
- The operating systems, network configurations, and applications on these instances are entirely at the discretion of EC2 clients.
- Customers may quickly expand or reduce capacity using EC2's scalable and flexible computing resources as required.
- Pay-per-use reserved instances and spot instances are just a few of the several price choices that EC2 provides, providing clients the freedom to choose the pricing plan that best suits their requirements.

Amazon EC2 is a service paradigm that offers Infrastructure as a Service as a result (IaaS).

Reference - https://docs.aws.amazon.com/whitepapers/latest/how-aws-pricing-works/amazon-elastic-compute-cloud-amazon-ec2.html

6. Consider the example of Zing Interactive Media and explain how you would launch the same service today using Amazon EC2. Specifically, list the steps (and costs) you would avoid by doing so.

Ans: If I were to start today, I would do it in line with Instagram's model. There would be no need to rent T1 lines, lease a "cage," purchase a server or pass through the other hoops. We would be able to concentrate only on the interactive radio application in its place. Furthermore, because our program could use a database as a service function, we wouldn't need to pay database administrators. Cloud Computing 12 Finally, we would engage fewer developers since it would be easy to create a reliable, scalable application by just setting the life cycle management rules in the appropriate Cloud provider service.

Reference: Textbook -Cloud Computing Business Trends and Technologies Page No: 11 and 12.

7. Consider the case of Instagram as described in the textbook. How many employees and customers did it have at the time of the purchase by Facebook? How much did Facebook pay for it? What was the value that the purchased business generated in the first two years, and what were the factors that enabled generating this value?

Ans: Instagram was acquired by Facebook for $1 billion. 30 million consumers were being served by Instagram's 11 workers at the time of the acquisition. It cost Facebook $1 billion. The business made $1 billion in the space of two years. The business was able to produce such value since there was little to no upfront investment in personnel or equipment. There were also no capital expenses, physical servers that needed to be purchased and maintained, technicians who needed to be paid to operate them, etc.

Reference: Textbook - Cloud Computing Business Trends and Technologies Page No: 25.

8. Explain what CPU pinning is and how Intel supports it with API.

Ans: The hypervisor and the cloud provider's infrastructure provide CPU pinning, which the application may use. While using greater abstraction layers makes things simpler, using generic services severely restricts one's capacity to create anything original. Or, to put it another way, a capacity cannot be utilized if it is not made available via an API. In a generic Cloud, for instance, it would be difficult to employ a certain advanced feature of a load balancer from a particular provider. Only the load balancing features offered by the cloud provider's API are usable, and sometimes one isn't even aware of which vendor powers the service. Here, descending the abstraction ladder is the solution. With the vendor's load balancer as an example, one may buy a virtual copy, set it up as a virtual machine as part of your project, and then utilize it. Higher abstraction layers may not, in other words, assist to meet specific needs.

Reference: Textbook - Cloud Computing Business Trends and Technologies Page No: 27

9. Study the Amazon EC2 SLA. What service commitment (in percentage) does it guarantee? What is the bound on the downtime in a year?

Ans: A regulation controlling the usage of Amazon Elastic Compute Cloud is known as the Amazon EC2 Service Level Agreement (SLA). During a monthly billing cycle, Amazon tries to keep Amazon EC2 up and running with a Monthly Uptime Percentage of at least 99.95%. The customer is entitled to earn Service Credit, which is computed as a percentage of the total costs paid by the customer, in any event when Amazon fails to uphold the Service Commitments. The proportion of minutes that Amazon Services were unavailable throughout the month is subtracted from 100% to get the monthly uptime percentage. The Service Credit Percentage is 10% and the Monthly Uptime Percentage is less than 99.95% but equal to or more than 99. This indicates that the Service Credit Percentage will be 10% for downtime of less than 1% and more than 0.05%. The Service Credit Percentage is 30% if the Monthly Uptime Percentage is less than 99%. This indicates that the Service Credit Percentage will be 30% for downtime of less than 1%. The maximum amount of downtime that may occur in a year is 0.5%, or 4.38 hours or 263 minutes.

Reference - https://aws.amazon.com/ec2/sla/

10. What is the "telecom-grade" service commitment? Who were the ETSI NFV Industry Specifications Group founders? List the areas where the NFV is expected to act. (Optional recommended reading: the ETSI NFV White Papers.)

Ans: The term "telecom grade" refers to gear that has been particularly built for use in telecommunications networks, is intended to last for more than 15 years, and is functional 99.999% of the time (the "five nines"), or with just around 5 minutes of downtime per year. The installation and upkeep of the specialized equipment are expensive. One can readily understand the issues that come with a 15-year commitment to specialized hardware equipment, especially considering Moore's "law," which states that computer power doubles every 18 months.

Reference - https://www.tmcnet.com/tmc/whitepapers/documents/whitepapers/2014/10694-cloudband-with-openstack-as-nfv-platform.pdf