CS 643-102, Cloud Computing – Homework 1

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1.   (3 points) What is the main economic reason that allows cloud providers to make money?

- **Freemium model**: This business model seeks to lower barriers to entry for online offerings by offering some core services at no charge, then charging a premium if the customer wants to upgrade to something more sophisticated.
- **Consumption model:** This is the classic, metered, "pay--as--you--go" offering seen with many cloud services.
- **Tiered pricing:** This is the most common model for enterprise SaaS, and has its roots in the dawn of enterprise software in the 1980s. The pricing tiers are typically tied into a metric, such as number of seats, modules, data volumes, and servers.
- **Perpetual license model**: This is probably as close as it gets to the old model for buying software -- pay one huge sum up front and get it for life.

2. (4 points) What is the main advantage of EBS over S3 in Amazon Web Services (AWS)? What is the main advantage of S3 over EBS?

- S3 (Simple Storage Service) and EBS (Elastic Block Store) are two file storage services provided by Amazon. The main difference between them is with what they can be used with. EBS is specifically meant for EC2 (Elastic Computing Cloud) instances and is not accessible unless mounted to one
- On the other hand, S3 is not limited to EC2. The files within an S3 bucket can be retrieved using HTTP protocols and even with BitTorrent. Many sites use S3 to hold most of their files because of its accessibility to HTTP clients. web browsers.
- You need some type of software in order to read or write information with S3. With EBS, a volume can be mounted on an EC2 instance and it would appear just like a hard disk partition. It can be formatted with any file system and files can be written or read by the EC2 instance just like it would to a hard drive.
- When it comes to the total amount that you can store, S3 still has the upper hand. EBS has a standard limit of 20 volumes with each volume holding up to 1TB of data. With S3, the standard limit is at 100 buckets with each bucket having an unlimited data capacity. S3 users do not need to worry about filling a bucket and the only concern is having enough buckets for your needs.
- A limitation of EBS is its inability to be used by multiple instances at once. Once it is mounted by an instance, no other instance can use it. S3 can have multiple images of its contents so it can be used by many at the same time. An interesting side-effect of this capability is something called 'eventual consistency'. With EBS, data read or write occurs almost instantly. With S3, the changes are not written immediately so if you write something, it may not be the data that a read operation returns.

3. (3 points) How does asynchronous communication in AWS SQS help with fault-tolerance?

- Simple Queue Service (SQS) is a highly reliable distributed messaging system that can serve as the backbone of fault-tolerant application
- SQS is engineered to provide "at least once" delivery of all messages
- Messages are guaranteed for sent to a queue are retained for up to four days(by default, and can be extended upto 14 days) or until they are read and deleted by the application
- Messages can be polled by multiple workers and processed, while SQS takes care that a request is processed by only one worker at a time using configurable time interval called visibility timeout
- If the number of messages in a queue starts to grow or if the average time to process a message becomes too high, workers can be scaled upwards by simply adding additional EC2 instances.