Ref Links:
    -> https://www.youtube.com/watch?v=qaAllMDf_rs

Volume and vault storage
What is cloud storage
Type of AWS storage
storage option in AWS
    -> EBS*
    -> Simple Storage Service (S3)*
    -> Amazon Glacier - for long term storage and very very cheap (low cost)
AWS Connection Storage
    -> Snowball - long term enterprise (Hybride infrastructure)
    -> Storage Gateway - long term enterprise (Hybride infrastructure

Volume: it is harddick volume. ex: folder and files
Vault: Storage device used for archivel data for longer period of time.

Tradetional Storage Tier's:
    -> tier0 ---> Ex: SSD, mostly used for DB's data storage
    -> tier1 ---> Ex: 10k rpm HDD (replication, RAID, mirror)
    -> tier2 ---> Ex: 7.2 rpm NL HDD (Erasure coding, RAID)
    -> tier3 ---> Ex: Cold or tape HDD

-> Performance and cost increase from Tier3 to tier0 ie: tier3 -> tier2 -> tier1 -> tier0
-> Capacity is more in tier3 ie: tier0 -> tier1 -> tier2 -> tier3
-> Tier3 and tier2 used for vault storage and tier0 and tier1 used for Volume
->

Disadvantages of treditinal storage and solution by Cloud:
1) Storage sitting idle in data center - pay infrastructure as u need it and no upfront payment.
2) Inactive data sitting in costly storage - data reduction technique and archiving to store
inactive cold data

EBS - it is the block storage - Accessed by one machine at a time - Like a Dard disk but not
actually
S3 and Glacier is the Object storage - Accessed directly by mutiple machines - stored i web
API's

Ex: EBS is used for databases (MySql) and application may have show images,videos are stored in
S3. Application write/retrive from S3 using web API's. But ur Dbs write/retrive from EBS using
OS level machanisim.

-> EBS is in tier0/1 and s3 in tier2 and Glacier in tier3

Storage Gateway - way to intergrate two sides.
Snowball - mainly for transfer. Ex: Data migration - Transfer the on-premesis data into cloud
- Faster data rate and encrypted data while data transfer.

Memory -
    -> TiB (Tebibyte): 1-TiB = 1.10TB = 1024GiB
    -> GiB (Gibibytes): 1-GiB = 1.07GB = 1024 MiB
    -> MiB (Mebibytes): 1-MiB = 1.05MB = 1024 KIB
    -> KiB (Kibibytes)

###---Elastic Block Storage (EBS)---###
    -> Provide block level storage volumes for EC2 instances. Ex: application , DB's
    -> EC2 instance must have one r more EBS volumes.
    -> Communcation happen through network b/n EC2 and EC2 not directly attached physically.
Ref Links:
    -> Amazon EBS Volumes:
        https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/EBSVolumes.html
    -> Amazon Elastic Block Store (Amazon EBS):
        https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/AmazonEBS.html?shortFooter=true

EBS Snapshot:

```
         -> Snapshot is the backup of ur EBS volume and it stored in S3.
         -> It is a incremental backup.
         -> it is encrypted volumes.
```

Q) Is it possible to change the EBS volume to different availability zones?
Scenario: I have a server created in "eu-west-1c" availability zone and I tried to attach the
volume created in "eu-west-1a" availability zone to "eu-west-1c" but the server created in
"eu-west-1c" is not reachable. Is it any way to attach among different availability zones?
Ans: When you create an EBS volume in an Availability Zone, it is automatically replicated
within that zone to prevent data loss due to failure of any single hardware component.
        After you create a volume, you can attach it to any EC2 instance in the same Availability
        Zone.

        Amazon EBS provides the ability to create snapshots (backups) of any EBS volume and write
        a copy of the data in the volume to Amazon S3,
        where it is stored redundantly in multiple Availability Zones. The volume does not need be
        attached to a running instance in order to take a snapshot.
        As you continue to write data to a volume, you can periodically create a snapshot of the
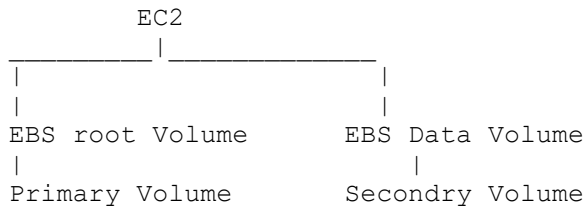   volume to use as a baseline for new volumes.
        These snapshots can be used to create multiple new EBS volumes or move volumes across
        Availability Zones.
Ref:
https://serverfault.com/questions/869710/is-it-possible-to-change-the-ebs-volume-to-different-ava
ilability-zones/873400

Features of EBS Volumes:
        -> Can be attached to any running instance to same AZ.

```
                EC2
     _____|_____
     |                          |
     |                          |
     EBS root Volume       EBS Data Volume
     |                          |
     Primary Volume        Secondry Volume
```

        -> EBS volume can be attached to server or detached from server within the same AZ.
        -> Even after terminate the EC2 instance u can attached EBS volume to an instance. ie. EBS
        volume (data) still in live.
        -> Encryting the EBS volumes
Types of EBS VOlumes:
        1) Provision IOPS (SSD) - Large DB's
        2) General Purpose (SSD) - Development and testing Env
        3) Magnetic - Cold storage

Q) For cold storage which EBS volume will be use? - Ans (C)
        a) Provision IOPS b) General Purpose   c) Magnetic d) None of the above

Q) Does EBS tolerate an AZ failure? - Ans (A)
        a) No, EBS volumes are stored in single AZ   b) Yes, an EBS volume has multiple cpoies so
        it should be fine
        c) Depends on how it is setup   d) Depends on the region where EBS volume is
        initiated

-> If hole AZ fails there is no way to revert the EBS volume.
-> We can't attached EBS volumes from one AZ to another AZ. Only possible with in a AZ.
-> Snapshot - A backup of ur EBS volume at that time and by using snapshot recreate your EBS
volume.

###---Simple Storage Service (S3)---###
-> It is a Object storage machanisim.
-> Each Amazon S3 object has data (ex: Imageas), a key (it is unique name) and metadata.
-> Uniquely identified within a bucket by a key(name) and a version ID
-> Each object can contain upto 5Tb of data.
-> no need to pay for upfront (for storage) and U HAVE TO pay only what u used.

What is bucket?
    -> used to store objects, which consists of data and metadata that describe the data.
    -> Bucket can be configured and created in a specific region.
    -> when object is added to bucket , Amazon s3 generate a unique verion ID and assigns to
    the object.
    -> By defacult, only 100 buckets can be created in each AWS account.
    -> Within bucket have folder and subfolders within that have objects.
    -> All objects can accessed via WEB API (URL).
    -> Simple interface that helps to store and retrive any amount of data, at any point of
    time, from any where from the web.
    -> Scenario: how do i use in my application?
        Ex Java/PHP/.NETApplication, Applicaiton running on EC2 instancea dnthat ec2 will have
        its own data volume (EBS) and seperate thing called S3, thinking where do we will store
        and what?
        Applcation Db, data will store in ur EBS volume and application may have things like
        images/videos/doc those will store in S3 and then ur application use this DB for some
        purpose and pick up the images from S3.

Amazon S3 - Access control line:
    -> Bucket permission specifies who is allowed the access to the objects in a bucket and
    what perticular permission have been granted .
    -> There are built-in groups, which can be used from the Grantee box.
        -> Everyone
        -> Log Delivery: when Bucket is used to store server access logs.
        -> Me
        -> Authenticated Users

Bucket Policy:
    -> It allows users to authorize policies which either grant or deny access to any number of
    accounts and acroos a range or set of keys.
    -> With bucket policies, you can also define security rules that apply to more then one
    file, including all files or subset of files within a bucket.
    -> Example: If we have to restrict a user to access the studentdata bucket then we can
    apply the security with the help JSON script and after that user will not able to access
    the bucket.
    -> Sample JSON :
        {
            "Version": "2017-00-17",
            "Statement": [
                {
                    "Effect": "Allow",
                    "Principal":{
                        "AWS": ["arn:aws:iam::<a/c_ID>:user/amar",
                                "arn:aws:iam::<Acc_ID>:root"]
                    },
                    "Action": "s3:*",
                    "Resource": ["arn:aws:s3:::my_bucket",
                                "arn:aws:s3:::mybucket/*"]
                }
            ]
        }

Types of S3 storage classes:

Characteristics	Standard	Standard -Infrequent Acess	Glacier	
Durability	99.9999...(11)%	99.9999%	99.99...(11)%	---> Chance of data lost (it's Virtual 0)
Availability	99.99%	99.90%	N/A	
Min_Object_size	No Limit	128Kb	No Limit	
Min_Storage_Duration	No Min Duration	30Days	90Days	
First_byte_Latency	Milliseconds	Milliseconds	4Hours	
Retrevel fee	No Fee	Per GB retreved	Per Gb	

    -> Durability of S3 standared is 11 nine's

```
    ->Standard - having lower availability
```

Amazon S3 - Reduced Redundance Storage (RRS):
    -> Reduced Redundancy Storage (RRS) is an Amazon S3 storage option that enables customers
    to store noncritical, reproducible data at lower levels of redundancy than Amazon S3's
    standard storage.
    -> It provides a highly available solution for distributing or sharing content that is
    durably stored elsewhere, or for storing thumbnails, transcoded media, or other processed
    data that can be easily reproduced.
    -> The RRS option stores objects on multiple devices across multiple facilities, providing
    400 times the durability of a typical disk drive, but does not replicate objects as many
    times as standard Amazon S3 storage.
    -> Designed to provide 99.99% durability and 99.99% availability of objects over a given
    year.
    -> Designed to sustain the loss of data in a single facility.

Cross-Region Replication:
    -> Replication enables automatic, asynchronous copying of objects across Amazon S3 buckets.
    -> Buckets that are configured for object replication can be owned by the same AWS account
    or by different accounts.
    -> You can copy objects between different AWS Regions or within the same Region.
    -> Replication in two different regions with same key name and metadata.

Versioning:
    -> Versioning is a means of keeping multiple variants of an object in the same bucket.
    -> You can use versioning to preserve, retrieve, and restore every version of every object
    stored in your Amazon S3 bucket.
    -> Versioning-enabled buckets enable you to recover objects from accidental deletion or
    overwrite.
    -> Once you version-enable a bucket, it can never return to an unversioned state. But
    versioning can be suspend on that bucket. By default it is on OFF state.

Amazon S3 Transfer Acceleration:
    -> Amazon S3 Transfer Acceleration enables fast, easy, and secure transfers of files over
    long distances between your client and an S3 bucket.
    -> Transfer Acceleration takes advantage of Amazon CloudFront's globally distributed edge
    locations.
    -> As the data arrives at an edge location, data is routed to Amazon S3 over an optimized
    network path.