BATCH : 149

LESSON : AWS DAY 9

DATE : 10.08.2022

SUBJECT : EBS VOLUMES

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AWS EBS (Elastic Block Store)

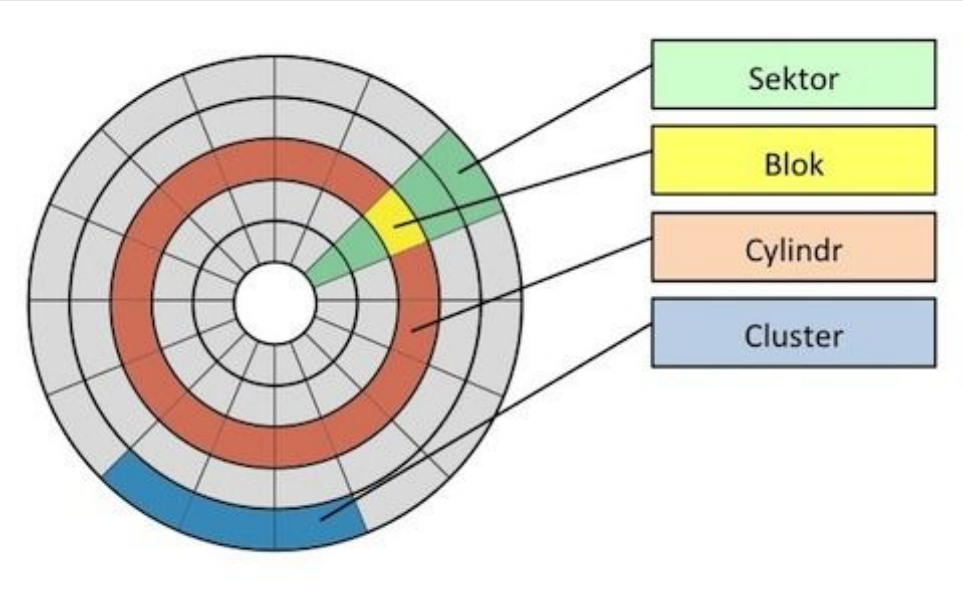
AWS Storage

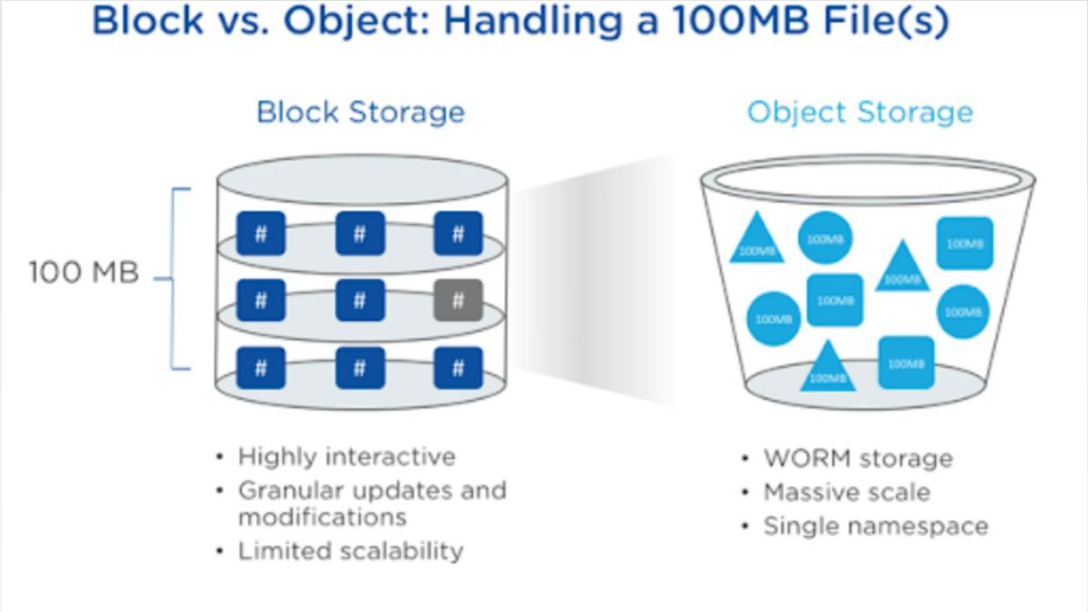
CLOUDIAN

STORAGE TYPES

	BLOCK STORAGE	FILE STORAGE	OBJECT STORAGE
			
TRANSPORT:	FC or iSCSI	TCP/IP	TCP/IP
INTERFACE:	Direct Attached or SAN	NFS, SMB	HTTP, REST
USE CASE:	Low Latency Best for Structured Data	Good Performance File Sharing, Global File Locking	Easy Scaling with No Limits Accessible across LAN & WAN

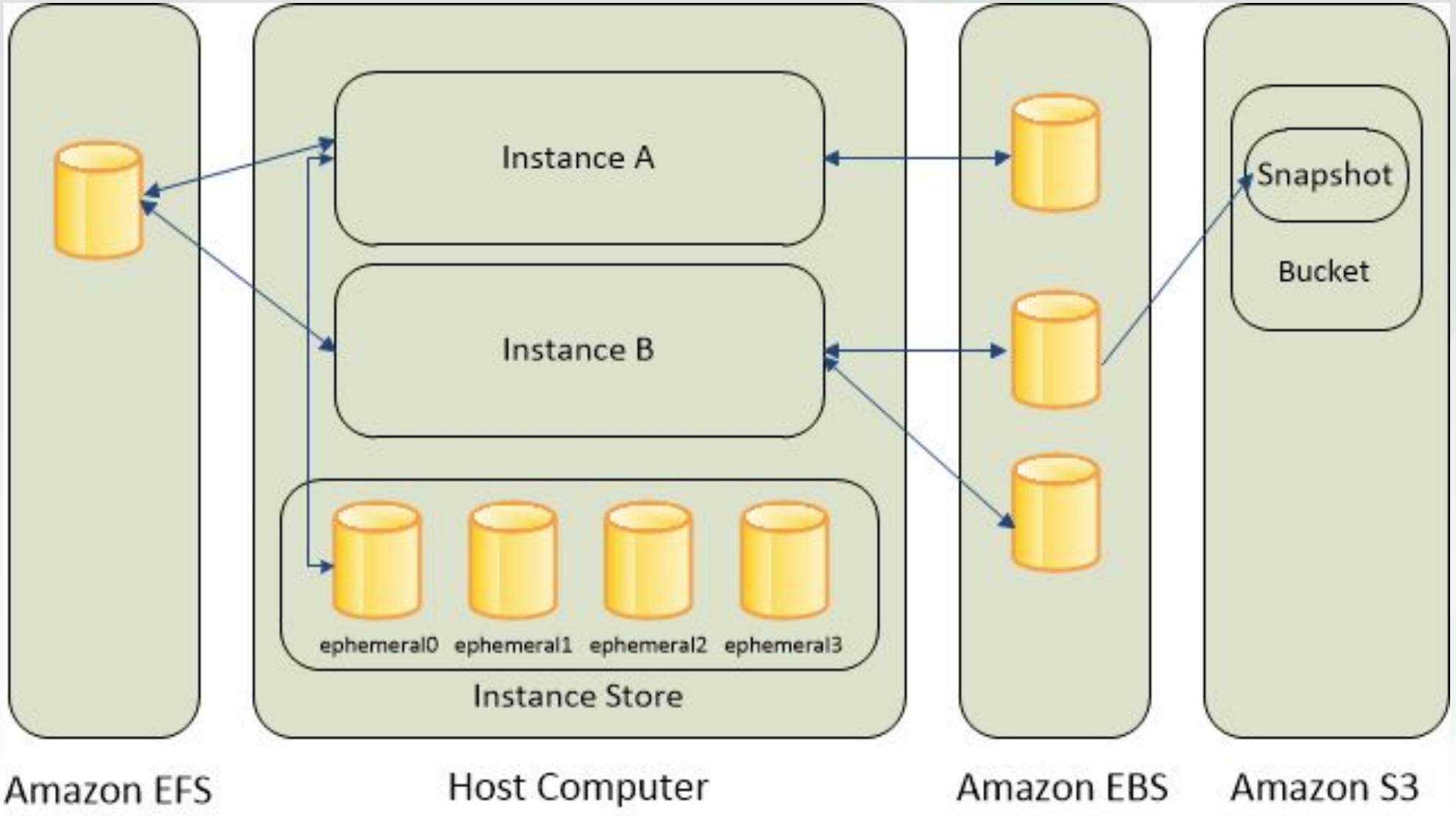
Block Storage





- Block storage has data in blocks
- You can create, partition and format volumes
- Hard drives we use are block based storage devices

AWS Storage


Instance A
Instance B
ephemeral0
ephemeral1
ephemeral2
ephemeral3
Instance Store
Snapshot
Bucket
Amazon EFS
Host Computer
Amazon EBS
Amazon S3

What is Elastic Block Storage(EBS)?

EBS = **E**lastic **B**lock **S**tore

Amazon Elastic Block Store (Amazon EBS) provides block level storage volumes for use with EC2 instances.

✔ EBS volumes provide benefits that are not provided by instance store volumes.

Data availability

Data persistence

Data encryption

Data security

Snapshots

Flexibility

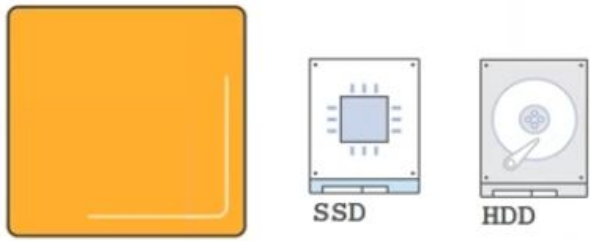
What is Elastic Block Storage(EBS)?

- EBS is like a network USB stick, it is not physically attached.
- You can attach to an instance while it is running
- It can persist data after termination
- They can be attached to one instance (some io1,io2 types can be multi-attached)
- They are bound to a specific AZ
- EBS volume snapshot can be taken to use it in another AZ
- EBS volumes are automatically replicated with in an AZ

EBS Instance Store vs EBS

EC2 Instance Store

- Local to instance
- Non-persistent data store
- Data not replicated (by default)
- No snapshot support
- SSD or HDD



Elastic Block Store

- Persistent block storage volumes
- 99.999% availability
- Automatically replicated within its Availability Zone (AZ)
- Point-in-time snapshot support
- Modify volume type as needs change
- SSD or HDD
- Auto recovery

https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/InstanceStorage.html#instance-store-volumes

EBS Volume Types - Solid state drives (SSD)

	General Purpose SSD		Provisioned IOPS SSD		
Volume type	gp3	gp2	io2 Block Express ‡	io2	io1
Durability	99.8% - 99.9% durability (0.1% - 0.2% annual failure rate)	99.8% - 99.9% durability (0.1% - 0.2% annual failure rate)	99.999% durability (0.001% annual failure rate)	99.999% durability (0.001% annual failure rate)	99.8% - 99.9% durability (0.1% - 0.2% annual failure rate)
Use cases	• Low-latency interactive apps • Development and test environments		Workloads that require: • Sub-millisecond latency • Sustained IOPS performance • More than 64,000 IOPS or 1,000 MiB/s of throughput	• Workloads that require sustained IOPS performance or more than 16,000 IOPS • I/O-intensive database workloads	
Volume size	1 GiB - 16 TiB		4 GiB - 64 TiB	4 GiB - 16 TiB	
Max IOPS per volume (16 KiB I/O)	16,000		256,000	64,000 †	
Max throughput per volume	1,000 MiB/s	250 MiB/s *	4,000 MiB/s	1,000 MiB/s †	
Amazon EBS Multi-attach	Not supported		Supported		
Boot volume	Supported				

EBS Volume Types - Hard disk drives (HDD)

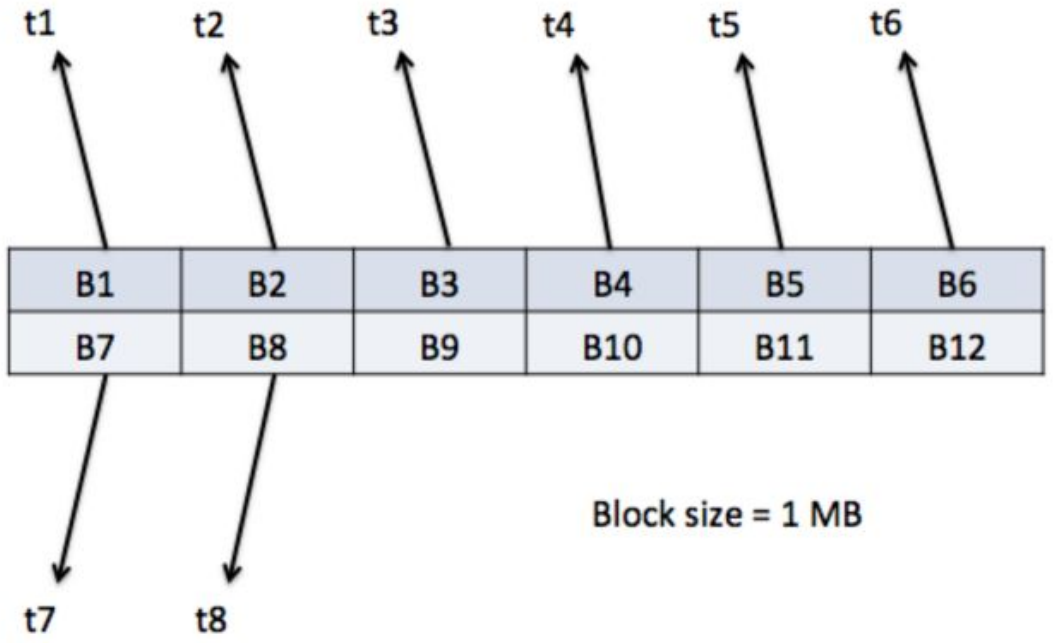
	Throughput Optimized HDD	Cold HDD
Volume type	`st1`	`sc1`
Durability	99.8% - 99.9% durability (0.1% - 0.2% annual failure rate)	99.8% - 99.9% durability (0.1% - 0.2% annual failure rate)
Use cases	• Big data • Data warehouses • Log processing	• Throughput-oriented storage for data that is infrequently accessed • Scenarios where the lowest storage cost is important
Volume size	125 GiB - 16 TiB	125 GiB - 16 TiB
Max IOPS per volume (1 MiB I/O)	500	250
Max throughput per volume	500 MiB/s	250 MiB/s
Amazon EBS Multi-attach	Not supported	Not supported
Boot volume	Not supported	Not supported

Storage Types

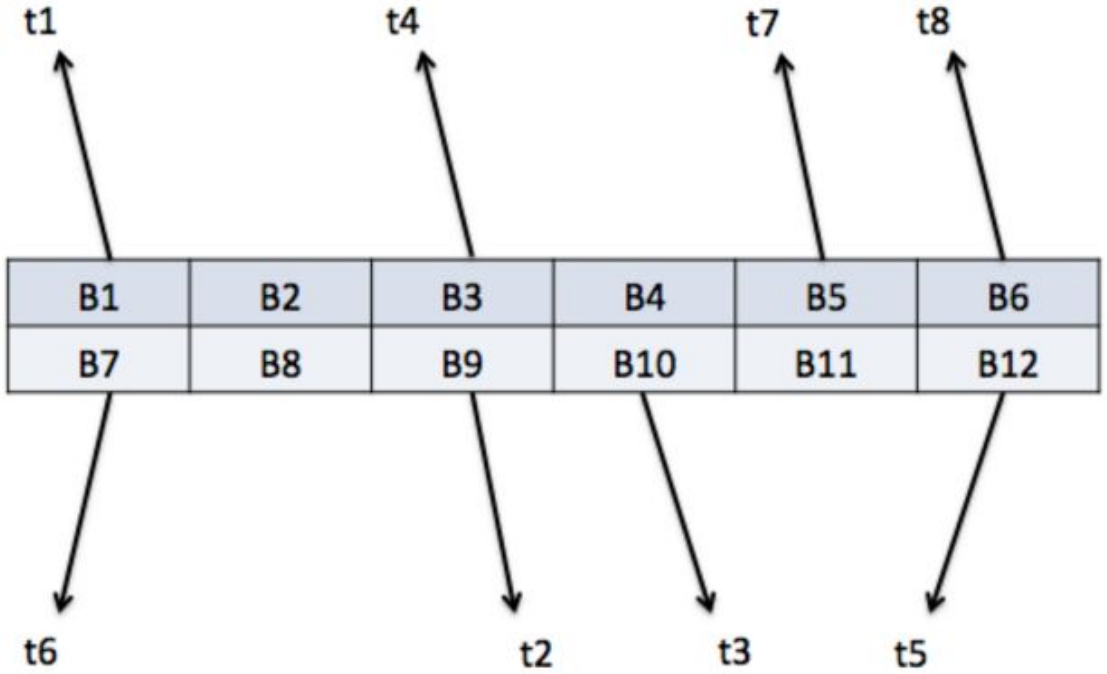
	Performance	Availability and Accessibility	Access Control	Storage and File Size Limits	Cost
Amazon S3	- Supports 3500 PUT / LIST / DELETE requests per second - Scalable to 5500 GET requests per second	- Usually 99.9% available - If lower, returns 10-100% of cost as service credits - Accessible via Internet using APIs	- Access is based on IAM - Uses bucket policies and user policies - Public access via Block Public Access	- No limit on quantity of objects - Individual objects up to 5TB	- **Free tier:** 5GB - **First 50 TB/month:** $0.023 per GB - **Next 450 TB/month:** $0.022 per GB - **Over 500 TB/month:** $0.021 per GB
AWS EBS	- HDD volumes: 250-500 IOPS/volume depending on volume type - SSD volumes: 16-64K IOPS/volume	- 99.99% available - Accessible via single EC2 instance	- Security groups - User-based authentication (IAM)	- Max storage size of 16TB - No file size limit on disk	- **Free tier:** 30GB - **General Purpose:** $0.045 per GB/month - **Provisioned SSD:** $0.125 per GB/month, $0.065 per IOPS/month
AWS EFS	- 3GB/s baseline performance - Up to 10GB/s - Up to 7K IOPS	- No publicly available SLA - Up to 1,000 concurrent EC2 instances - Accessible from any AZ or region	- IAM user-based authentication - Security groups	- 16TB per volume - 52TB maximum for individual files	- **Standard storage:** $0.30-$0.39 per GB-month depending on region - **Infrequent storage:** $0.025-$0.03 per GB-month - **Provisioned throughput:** $6 per MB/s-month

Throughput (HDD) vs IOPS (SSD)

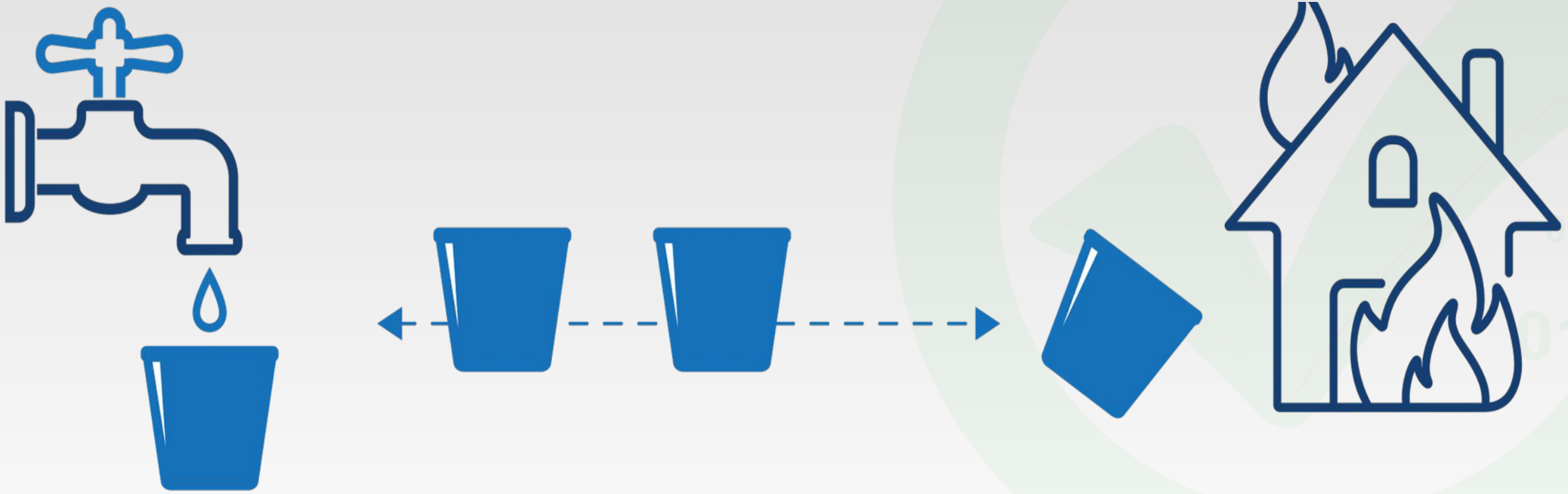
Throughput (HDD)



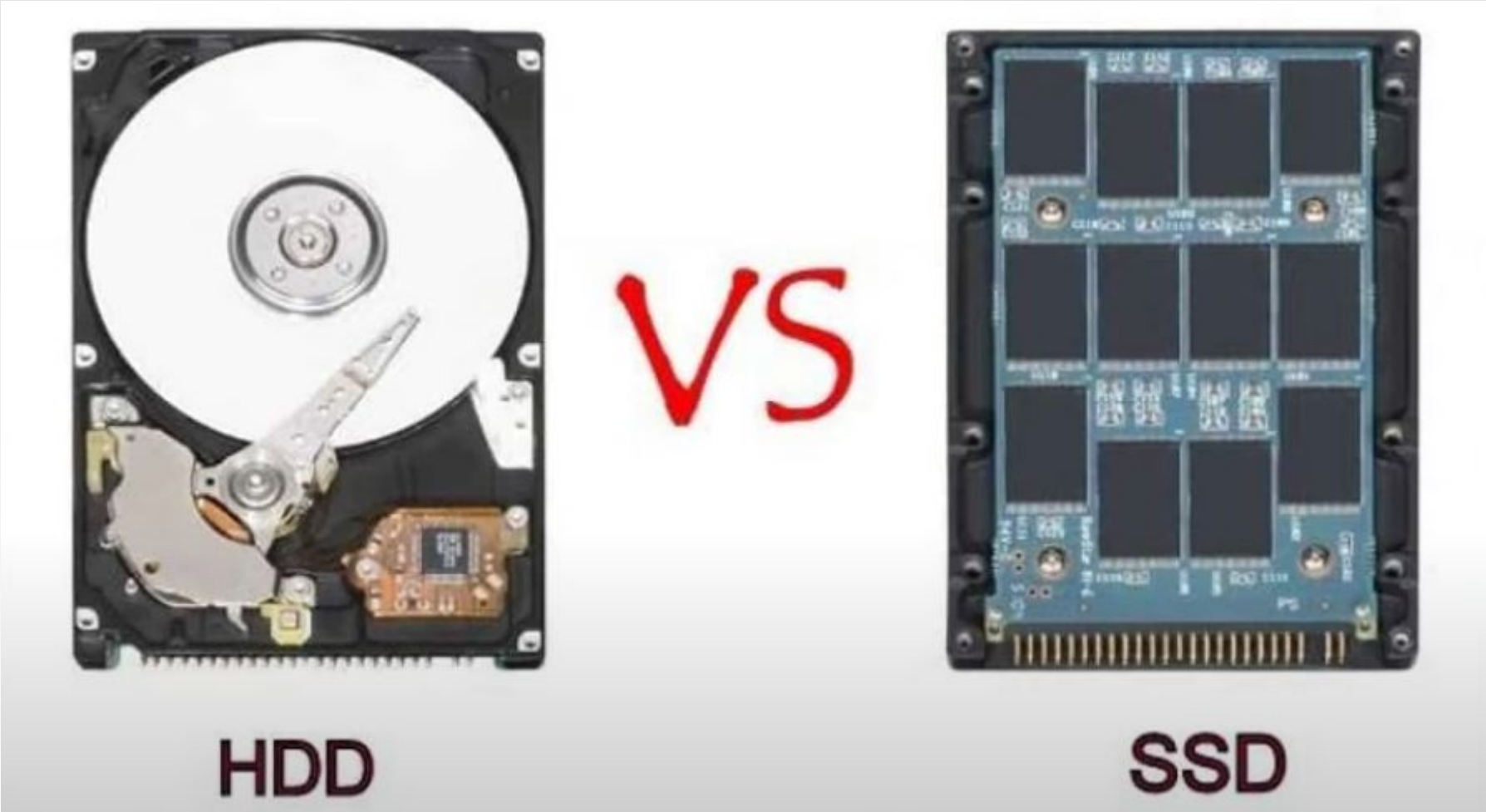
IOPS (SDD)



Throughput (HDD) vs IOPS (SSD)



HDD - SSD



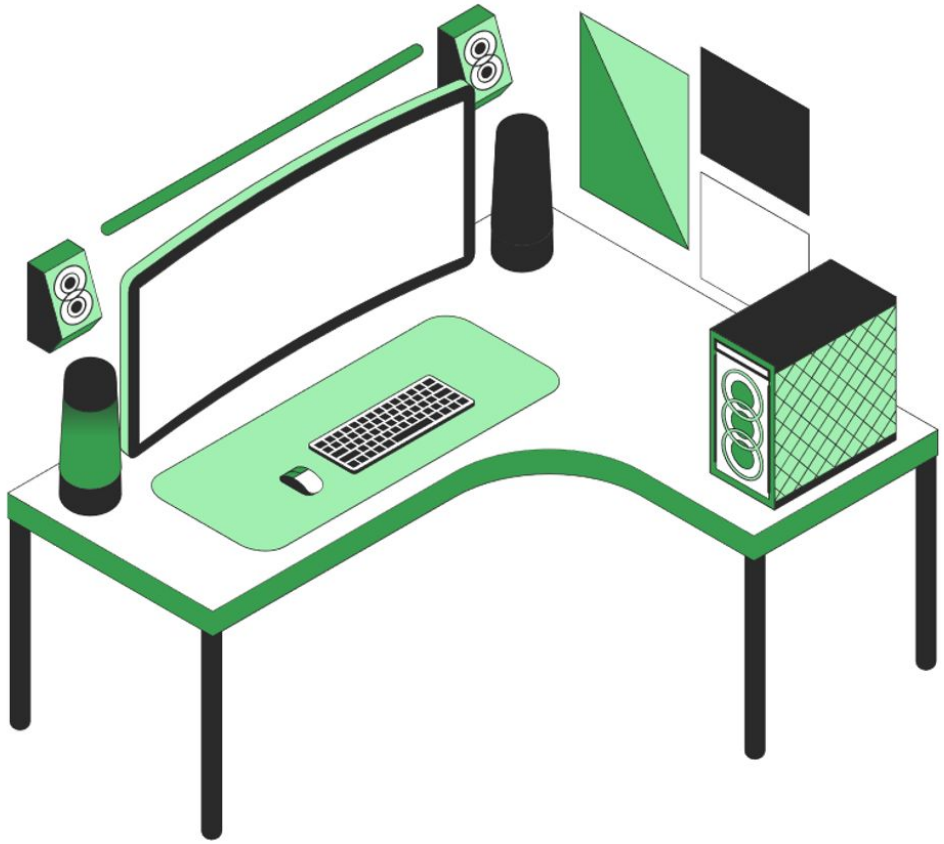
Solution Architect Cases

1. We need a high performance storage solution for our test purposes. Data losses do not matter.
   What is your solution?

2. We have an EBS volume in us-east-1 region. We need to move it to eu-west-1.
   What is the best approach?

3. We need an EBS storage that can support OS.
   What is your advice?

4. You have launched an EC2 instance with two EBS volumes, Root volume type and the other EBS volume type to store the data. A month later you are planning to terminate the EC2 instance.
   What's the default behavior that will happen to each EBS volume?



Do you have any questions?

Send it to us! We hope you learned something new.