MALLA REDDY UNIVERSITY
(MR22-1CS0108) CLOUD COMPUTING

UNIT III

AWS EBS: Create EBS volumes, Delete EBS Volumes, Attach and detach EBS volumes, Mounting and unmounting EBS volume.

Networking and Content Delivery: Networking basics, Amazon VPC, VPC networking, VPC security, Route 53, Cloud Front.

Amazon Elastic Block Store (Amazon EBS):

Amazon EBS enables you to create individual storage volumes and attach them to an Amazon EC2 instance.

Amazon EBS offers block-level storage, where its volumes are automatically replicated within its Availability Zone.

Amazon EBS is designed to provide durable, detachable, block-level storage (which is like an external hard drive) for your Amazon EC2 instances.

Because they are directly attached to the instances, they can provide low latency between where the data is stored and where it might be used on the instance.
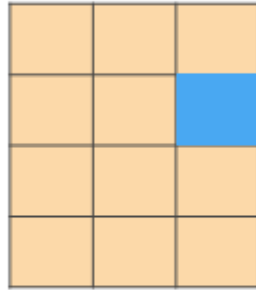
Amazon EBS volumes uses include:
- Boot volumes and storage for Amazon EC2 instances
- Data storage with a file system
- Database hosts
- Enterprise applications

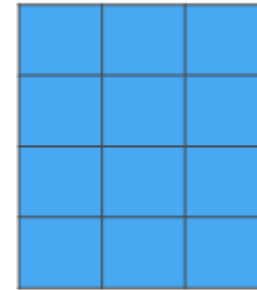# AWS storage options: Block storage versus object storage

What if you want to change **one character** in a 1-GB file?

Block storage

Change one block (piece of the file)
that contains the character

Object storage

Entire file must be updated

What happens if you want to change one character in a 1-GB file? With block storage, you change only the block that contains the character. With object storage, the entire file must be updated.

Amazon EBS volume types:

➢ **SSD-backed Storage Volumes**
➢ **HDD-backed Storage Volumes**

Solid state drive (SSD) volumes

SSD-backed storage volumes are perfect for transactional workloads, such as databases and virtual desktops. They are especially suitable for demanding applications like SAP HANA, Microsoft SQL Server, and IBM DB2.

SSD-backed EBS storage volumes are classified into:

1)**General Purpose SSD**
2)**Provisioned IOPS**

General Purpose SSD:

➢ General Purpose SSDs strike a balance between **IOPS (Input/Output Operations Per Second)** and throughput, making them ideal for applications that need a mix of read/write operations and quick response times.

➢ GP2 and GP3 are EBS volume types that provide various price-performance options within the SSD category.

➢ The newer GP3 volumes are particularly attractive, offering up to 20% lower cost per GB compared to GP2.

➢ They are well-suited for applications that require high performance at a lower cost, such as MySQL, Cassandra, virtual desktops, and Hadoop analytics clusters.

Provisioned IOPS:

➢ Provisioned IOPS volumes are tailored for mission-critical applications that demand consistent, high IOPS performance with predictable, sub-millisecond latencies.

➢ These EBS volume types deliver the provisioned performance 99.9% of the time, making them ideal for applications like SAP HANA, Oracle, Microsoft SQL Server, and IBM DB2 that require high availability and reliability.

HDD-backed Storage Volumes

HDD-backed storage is ideal for workloads that need high throughput, such as MapReduce tasks and log processing.

These volumes are more cost-effective per gigabyte compared to SSDs and are divided into two main categories:

1)**Throughput Optimized HDD Volumes**
2) **Cold HDD**

Throughput Optimized HDD volumes:

➢ Throughput Optimized HDD volumes are designed for workloads with high sequential data access patterns.

➢ They provide good throughput at a lower cost per gigabyte than SSDs, making them suitable for tasks like Amazon EMR, ETL, data warehouses, and large-scale data processing.

➢ These EBS volume types offer a baseline throughput of 40 MB/s per TB and can burst up to 250 MB/s per TB and 500 MB/s per volume, supporting high throughput and I/O-intensive workloads.

Cold HDD :

➢ Cold HDD volumes are the most cost-effective option for infrequently accessed data, like archives.

➢ They offer the lowest storage cost per gigabyte and have the slowest access times, making them perfect for backups, disaster recovery data, or logs that are rarely accessed.

➢ Cold HDD volumes are ideal for workloads with occasional bursts of I/O, providing a baseline throughput of 12 MB/s per TB, with the ability to burst up to 80 MB/s per TB or 250 MB/s per volume.

➢ This makes them a budget-friendly choice for workloads with relatively low average I/O needs.

EBS Volume Type	Category	Performance Characteristics	Ideal Use Cases	Cost Consideration
General Purpose SSD (gp2)	SSD-backed	– Baseline 3 IOPS per GB – Burst up to 3,000 IOPS	– Boot volumes – Small/medium databases – Development/test environments	Moderate cost, flexible performance
General Purpose SSD (gp3)	SSD-backed	– Consistent 3,000 IOPS baseline – Up to 16,000 IOPS – Max throughput 1,000 MB/s	– MySQL, Cassandra – Virtual desktops – Hadoop analytics clusters	Lower cost per GB compared to gp2
Provisioned IOPS (io1)	SSD-backed	– Up to 64,000 IOPS per volume – Predictable, low-latency I/O	– Mission-critical databases – Large-scale transactional applications	Higher cost, very high performance
Provisioned IOPS (io2)	SSD-backed	– Enhanced durability – Same IOPS as io1	– SAP HANA, Oracle	

EBS Volume Type	Category	Performance Characteristics	Ideal Use Cases	Cost Consideration
Throughput Optimized HDD (st1)	HDD-backed	– Baseline 40 MB/s per TB – Burst up to 250 MB/s per TB – Max throughput 500 MB/s per volume	– Big data, data warehousing – Log processing – Streaming large datasets	Lower cost per GB than SSDs
Cold HDD (sc1)	HDD-backed	– Baseline 12 MB/s per TB – Burst up to 80 MB/s per TB – Max throughput 250 MB/s per volume	– Backup and archival – Disaster recovery data – Rarely accessed logs	Lowest cost, lowest performance