



Module 7: Storage

AWS Academy Cloud Foundations

Module overview

Topics

- Amazon Elastic Block Store (Amazon EBS)
- Amazon Simple Storage Service (Amazon S3)
- Amazon Elastic File System (Amazon EFS)
- Amazon Simple Storage Service Glacier

Demos

- Amazon EBS console
- Amazon S3 console
- Amazon EFS console
- Amazon S3 Glacier console

Lab

- Working with Amazon EBS

Activities

- Storage solution case study



Knowledge check

Module objectives

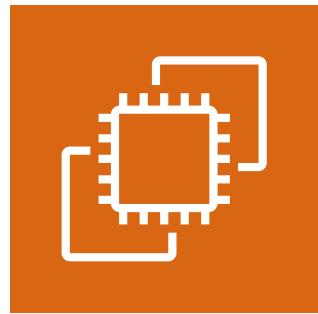
After completing this module, you should be able to:

- Identify the different types of storage
- Explain Amazon S3
- Identify the functionality in Amazon S3
- Explain Amazon EBS
- Identify the functionality in Amazon EBS
- Perform functions in Amazon EBS to build an Amazon EC2 storage solution
- Explain Amazon EFS
- Identify the functionality in Amazon EFS
- Explain Amazon S3 Glacier
- Identify the functionality in Amazon S3 Glacier
- Differentiate between Amazon EBS, Amazon S3, Amazon EFS, and Amazon S3 Glacier

Core AWS services



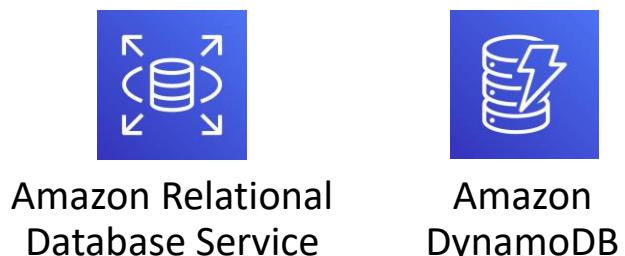
**Amazon Virtual
Private Cloud
(Amazon VPC)**



**Amazon Elastic
Compute Cloud
(Amazon EC2)**



Storage



Database



**AWS Identity and Access
Management (IAM)**

Section 1: Amazon Elastic Block Store (Amazon EBS)

Module 7: Storage

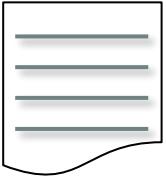


Storage

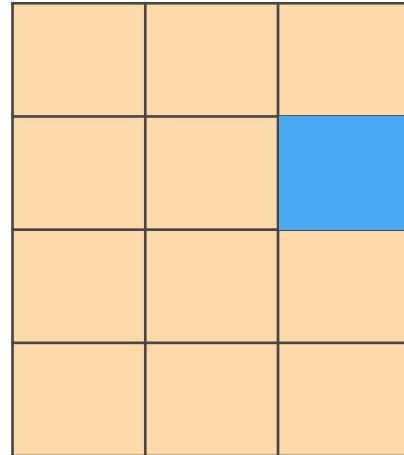


Amazon Elastic Block Store
(Amazon EBS)

AWS storage options: Block storage versus object storage



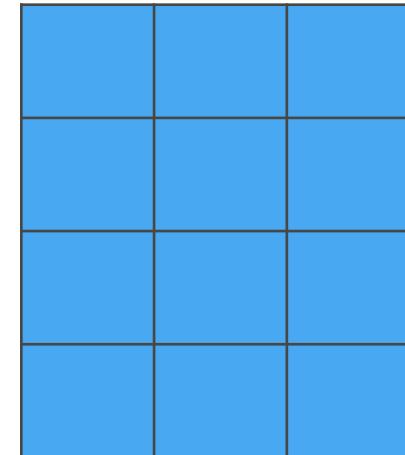
What if you want to change **one character** in a 1-GB file?



Block storage

Change one block (piece of the file)

that contains the character



Object storage

Entire file must be updated

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.
- Volumes are automatically replicated within its Availability Zone.
- It can be backed up automatically to Amazon S3 through snapshots.
- Uses include –
 - Boot volumes and storage for Amazon Elastic Compute Cloud (Amazon EC2) instances
 - Data storage with a file system
 - Database hosts
 - Enterprise applications

Amazon EBS volume types

Maximum Volume Size
Maximum IOPS/Volume
Maximum Throughput/Volume

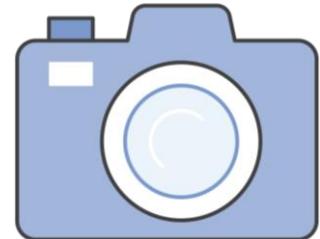
	Solid State Drives (SSD)		Hard Disk Drives (HDD)	
	General Purpose	Provisioned IOPS	Throughput-Optimized	Cold
Maximum Volume Size	16 TiB	16 TiB	16 TiB	16 TiB
Maximum IOPS/Volume	16,000	64,000	500	250
Maximum Throughput/Volume	250 MiB/s	1,000 MiB/s	500 MiB/s	250 MiB/s

Amazon EBS volume type use cases

Solid State Drives (SSD)		Hard Disk Drives (HDD)	
General Purpose	Provisioned IOPS	Throughput-Optimized	Cold
<ul style="list-style-type: none">This type is recommended for most workloads	<ul style="list-style-type: none">Critical business applications that require sustained IOPS performance, or more than 16,000 IOPS or 250 MiB/second of throughput per volumeLarge database workloads	<ul style="list-style-type: none">Streaming workloads that require consistent, fast throughput at a low price	<ul style="list-style-type: none">Throughput-oriented storage for large volumes of data that is infrequently accessed
<ul style="list-style-type: none">System boot volumesVirtual desktopsLow-latency interactive applicationsDevelopment and test environments		<ul style="list-style-type: none">Big dataData warehousesLog processing	<ul style="list-style-type: none">Scenarios where the lowest storage cost is importantIt cannot be a boot volume
		<ul style="list-style-type: none">It cannot be a boot volume	

Amazon EBS features

- Snapshots –
 - Point-in-time snapshots
 - Recreate a new volume at any time
- Encryption –
 - Encrypted Amazon EBS volumes
 - No additional cost
- Elasticity –
 - Increase capacity
 - Change to different types



Amazon EBS: Volumes, IOPS, and pricing

1. Volumes –

- Amazon EBS volumes persist independently from the instance.
- All volume types are charged by the amount that is provisioned per month.

2. IOPS –

- General Purpose SSD:
 - Charged by the amount that you provision in GB per month until storage is released.
- Magnetic:
 - Charged by the number of requests to the volume.
- Provisioned IOPS SSD:
 - Charged by the amount that you provision in IOPS (multiplied by the percentage of days that you provision for the month).

Amazon EBS: Snapshots and data transfer

3. Snapshots –

- Added cost of Amazon EBS snapshots to Amazon S3 is per GB-month of data stored.

4. Data transfer –

- Inbound data transfer is free.
- Outbound data transfer across Regions incurs charges.

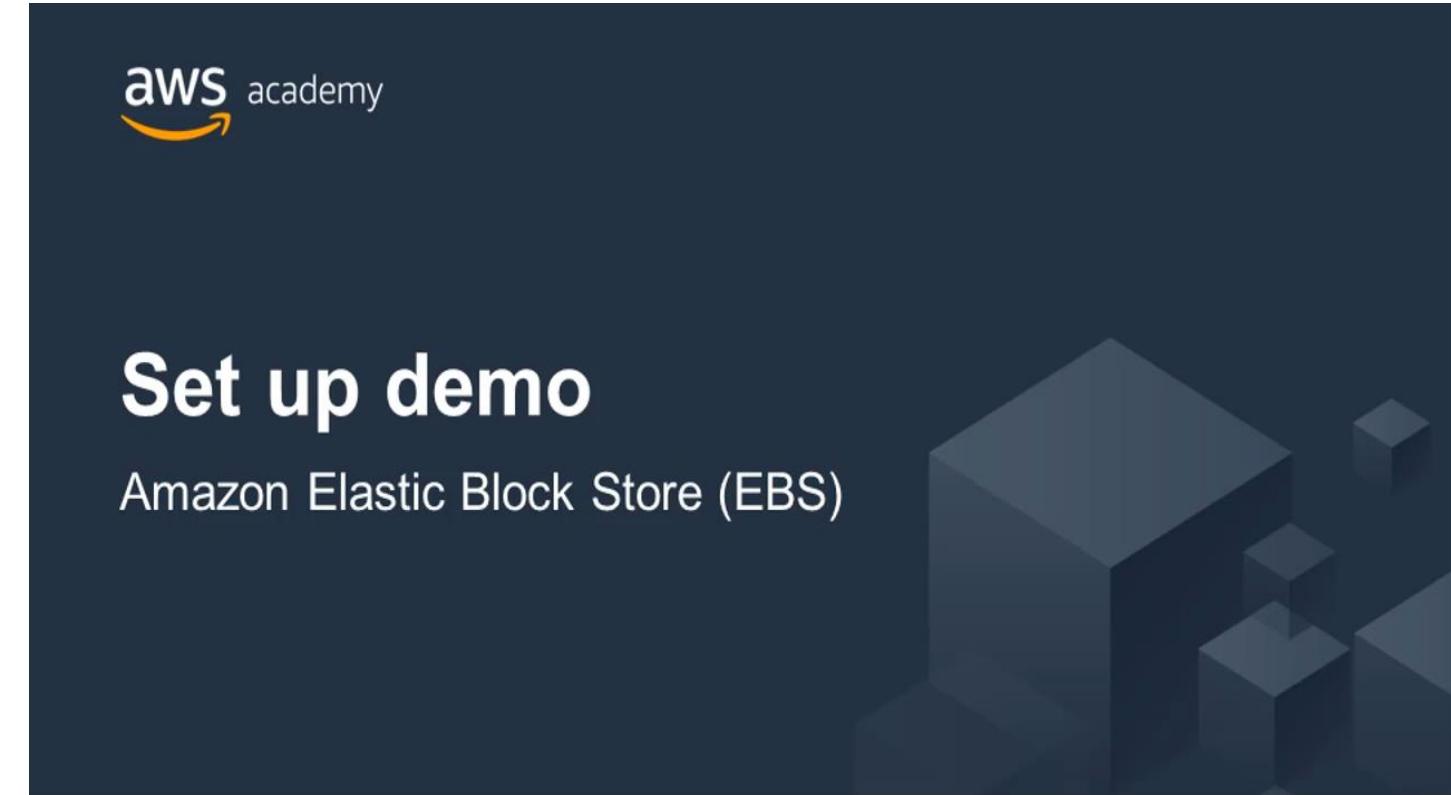
Section 1 key takeaways



Amazon EBS features:

- Persistent and customizable block storage for Amazon EC2
- HDD and SSD types
- Replicated in the same Availability Zone
- Easy and transparent encryption
- Elastic volumes
- Back up by using snapshots

Recorded demo: Amazon Elastic Block Store



Lab 4: Working with Amazon EBS



Lab 4: Scenario

This lab is designed to show you how to create an Amazon EBS volume. After you create the volume, you will attach the volume to an Amazon EC2 instance, configure the instance to use a virtual disk, create a snapshot and then restore from the snapshot.



Lab 4: Final product





~ 30 minutes



Begin Lab 4: Working with Amazon EBS

Lab debrief: Key takeaways



Section 2: Amazon Simple Storage Service (Amazon S3)

Module 7: Storage



Storage



Amazon Simple Storage Service
(Amazon S3)

Amazon S3 overview

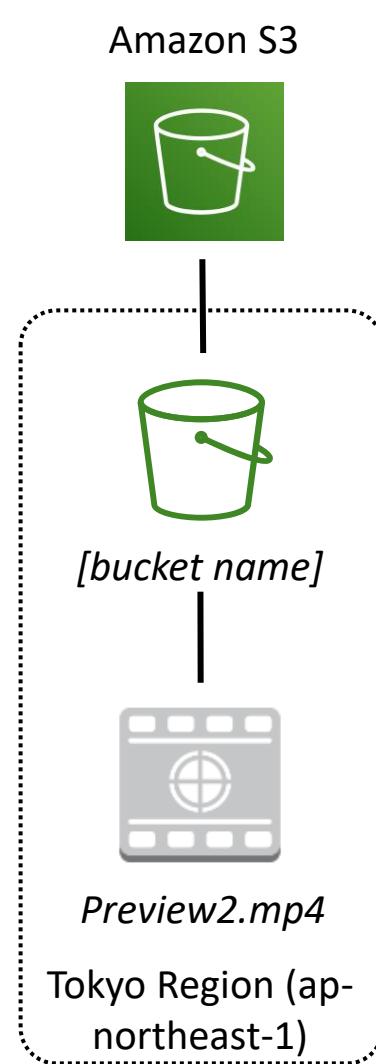
- Data is stored as objects in buckets
- Virtually unlimited storage
 - Single object is limited to 5 TB
- Designed for 11 9s of durability
- Granular access to bucket and objects

Amazon S3 storage classes

Amazon S3 offers a range of object-level storage classes that are designed for different use cases:

- Amazon S3 Standard
- Amazon S3 Intelligent-Tiering
- Amazon S3 Standard-Infrequent Access (Amazon S3 Standard-IA)
- Amazon S3 One Zone-Infrequent Access (Amazon S3 One Zone-IA)
- Amazon S3 Glacier
- Amazon S3 Glacier Deep Archive

Amazon S3 bucket URLs (two styles)



To upload your data:

1. Create a **bucket** in an AWS Region.
2. Upload almost any number of **objects** to the bucket.

Bucket path-style URL endpoint:

<https://s3.ap-northeast-1.amazonaws.com/bucket-name>

Region code

Bucket name

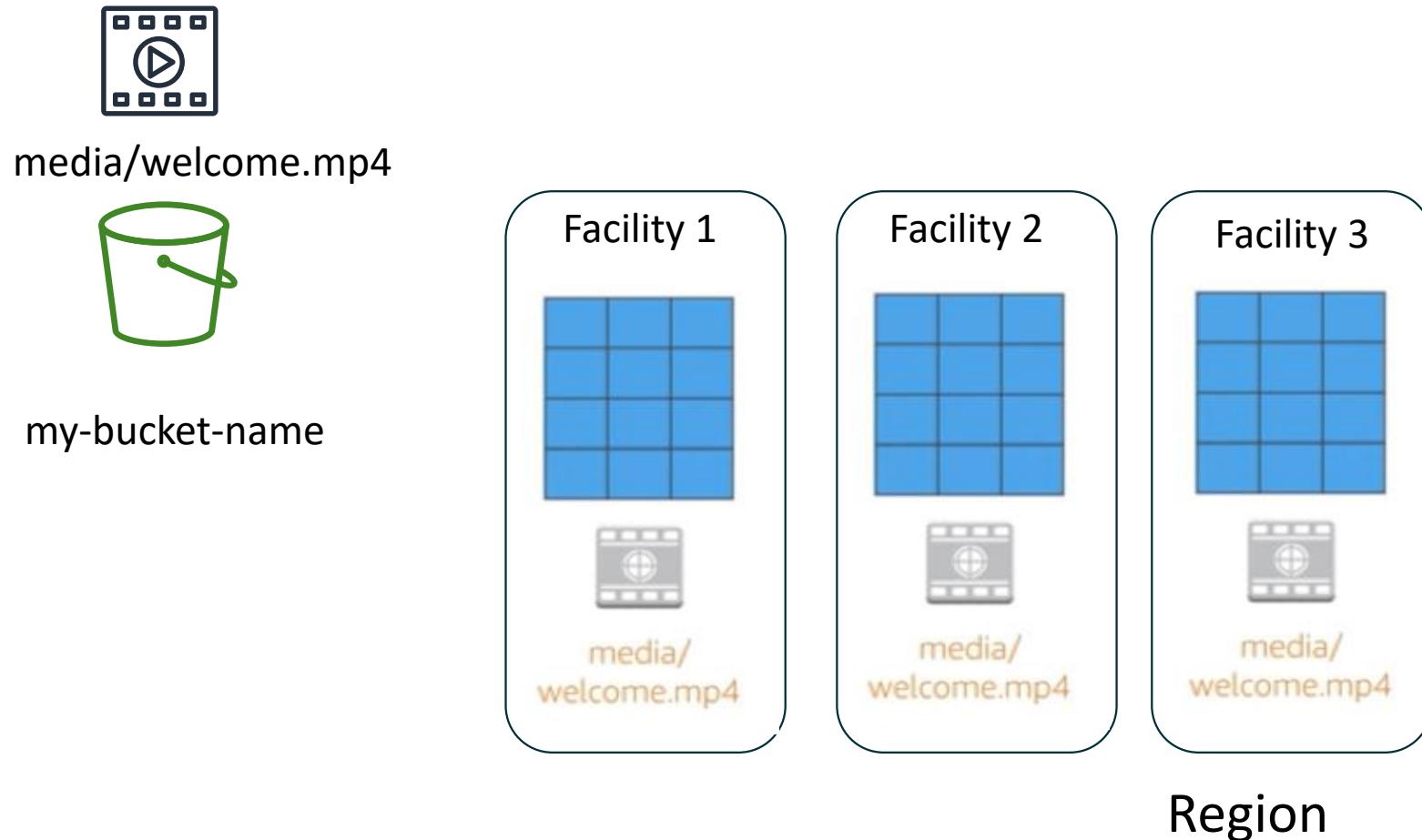
Bucket virtual hosted-style URL endpoint:

<https://bucket-name.s3-ap-northeast-1.amazonaws.com>

Bucket name

Region code

Data is redundantly stored in the Region



Designed for seamless scaling



my-bucket-name



media/welcome.mp4



prod2.mp4



prod3.mp4



prod4.mp4



prod5.mp4



prod6.mp4



prod7.mp4



prod8.mp4



prod9.mp4



prod10.mp4



prod11.mp4



prod12.mp4

Access the data anywhere



AWS Management
Console



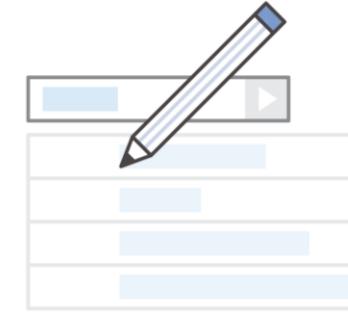
AWS Command Line
Interface



SDK

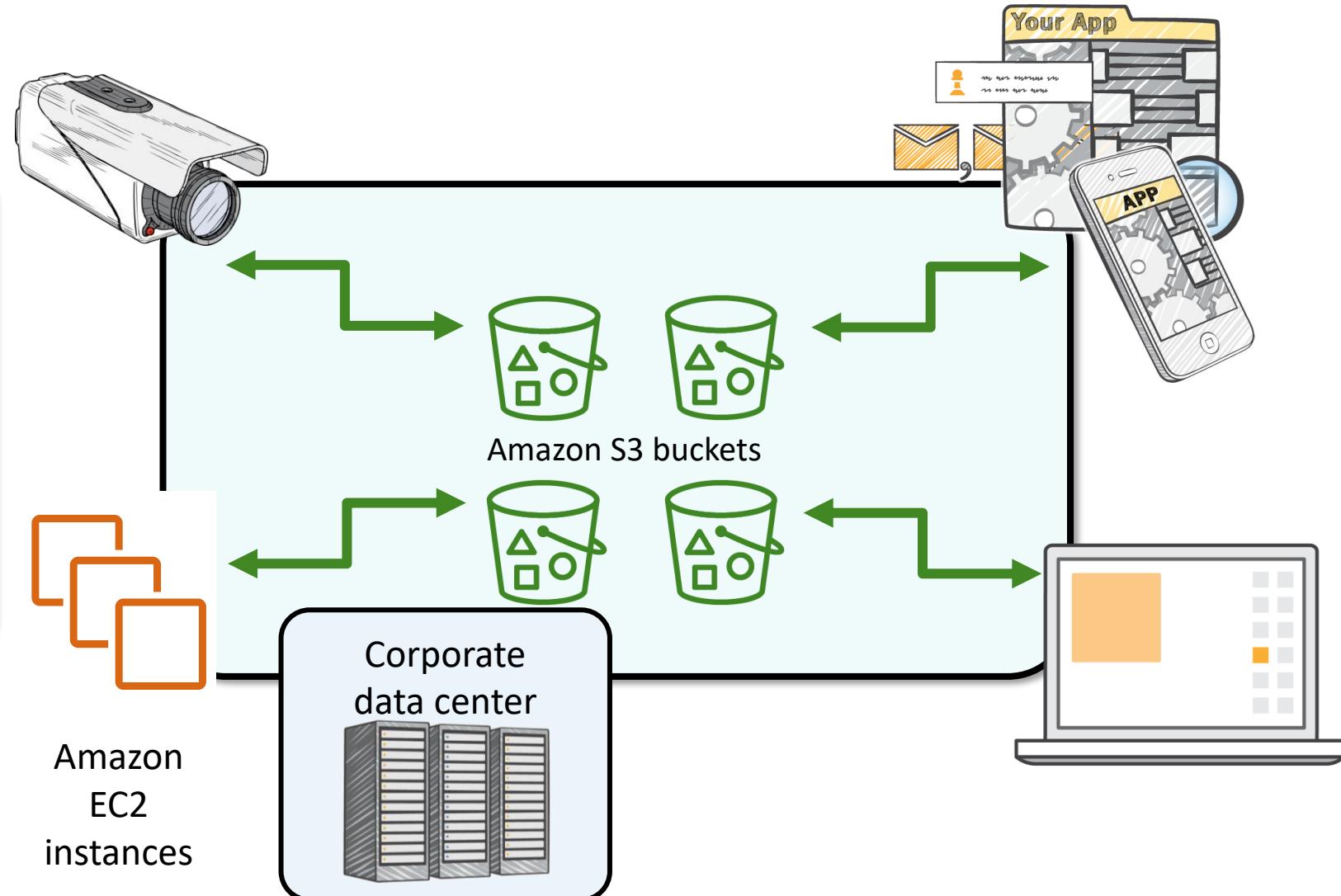
Common use cases

- Storing application assets
- Static web hosting
- Backup and disaster recovery (DR)
- Staging area for big data
- *Many more....*



Amazon S3 common scenarios

- Backup and storage
- Application hosting
- Media hosting
- Software delivery



Amazon S3 pricing

- Pay only for what you use, including –
 - GBs per month
 - Transfer OUT to other Regions
 - PUT, COPY, POST, LIST, and GET requests
- You do not pay for –
 - Transfers IN to Amazon S3
 - Transfers OUT from Amazon S3 to Amazon CloudFront or Amazon EC2 in the same Region

Amazon S3: Storage pricing (1 of 2)

To estimate Amazon S3 costs, consider the following:

1. Storage class type –

- Standard storage is designed for:
 - 11 9s of durability
 - Four 9s of availability
- S3 Standard-Infrequent Access (S-IA) is designed for:
 - 11 9s of durability
 - Three 9s of availability

2. Amount of storage –

- The number and size of objects

Amazon S3: Storage pricing (2 of 2)

3. Requests –

- The number and type of requests (**GET, PUT, COPY**)
- Type of requests:
 - Different rates for GET requests than other requests.

4. Data transfer –

- Pricing is based on the amount of data that is transferred out of the Amazon S3 Region
- Data transfer in is free, but you incur charges for data that is transferred out.

Section 2 key takeaways



- Amazon S3 is a fully managed cloud storage service.
- You can store a virtually unlimited number of objects.
- You pay for only what you use.
- You can access Amazon S3 at any time from anywhere through a URL.
- Amazon S3 offers rich security controls.

Recorded demo:
Amazon Simple
Storage System

