AWS re:Invent

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STG314-R

Amazon EBS snapshots: Build protection and cost-optimize

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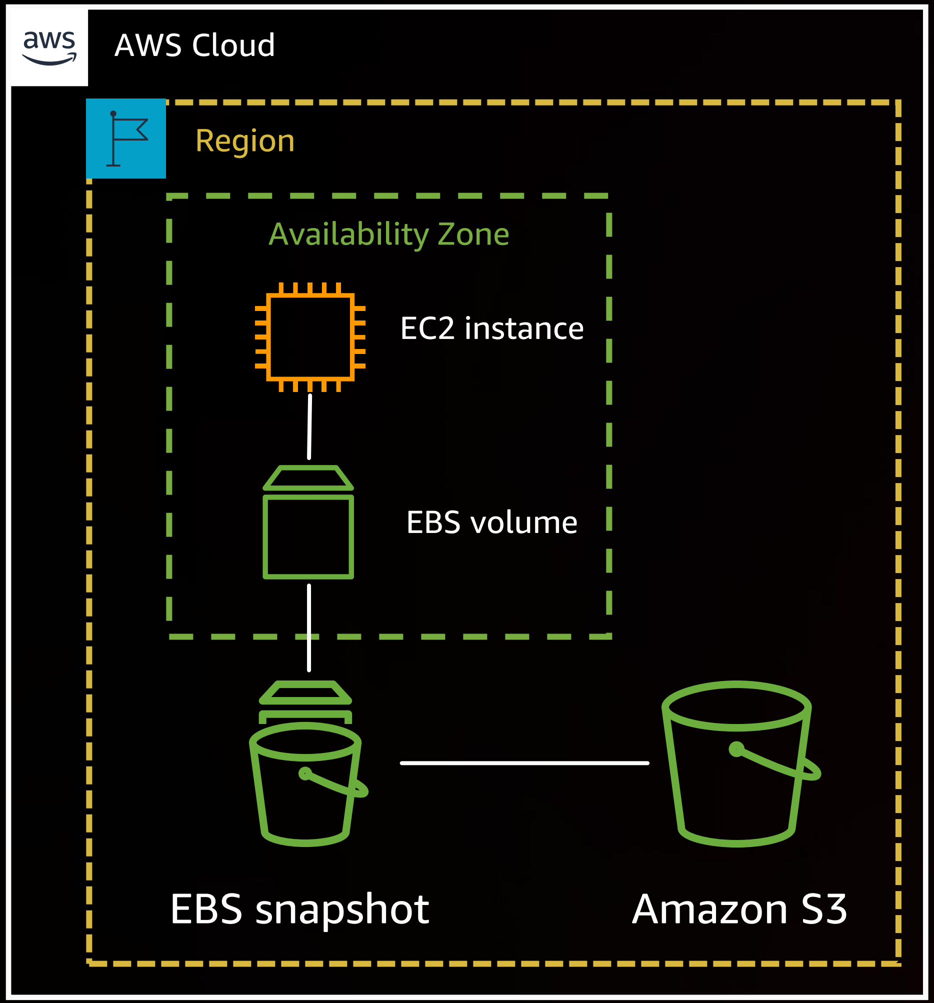
Agenda

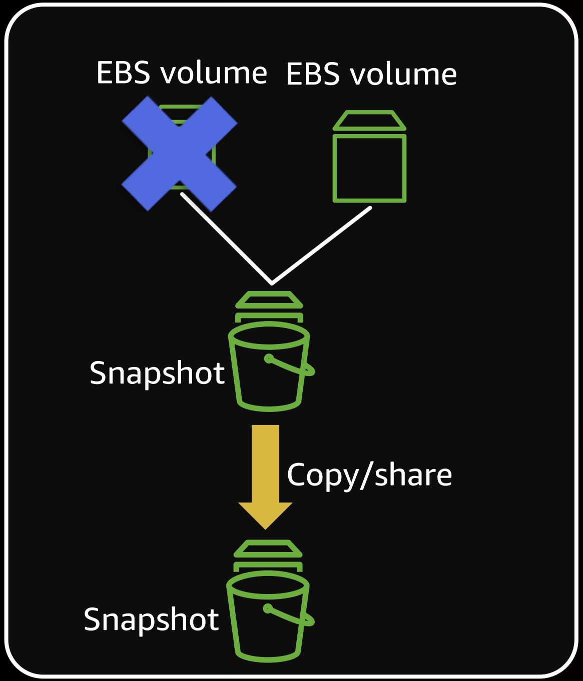
1. Intro to Amazon EBS snapshots
2. Amazon Data Lifecycle Manager
3. Recycle Bin for Amazon EBS snapshots and AMIs
4. Amazon EBS Snapshots Archive
5. Amazon EBS direct APIs
6. Hands-on lab

What are Amazon EBS snapshots?

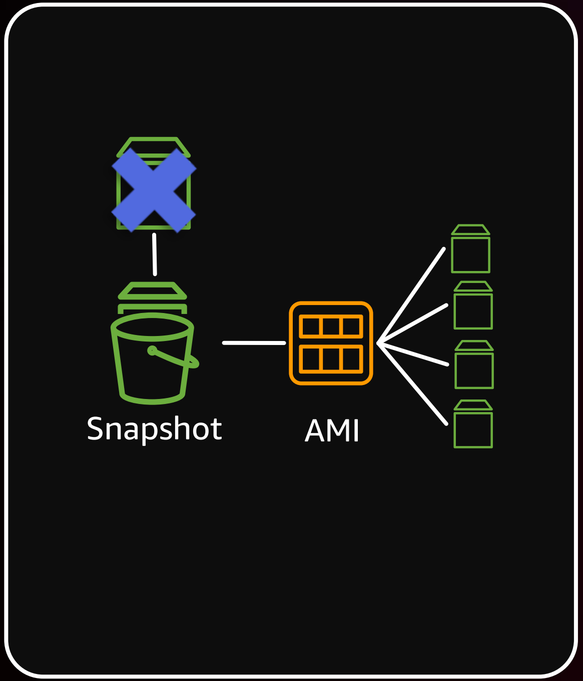


- **Point-in-time backups** of EBS volumes
- Stored on Amazon S3
- Properties
  - **Incremental** – only changed blocks stored
  - **Crash consistent** – completed I/Os persisted in next snapshot
  - Crash-consistent snapshots can be taken with **1 API call for a subset of volumes attached to an instance**
  - Can be **shared and copied** across accounts and AWS Regions

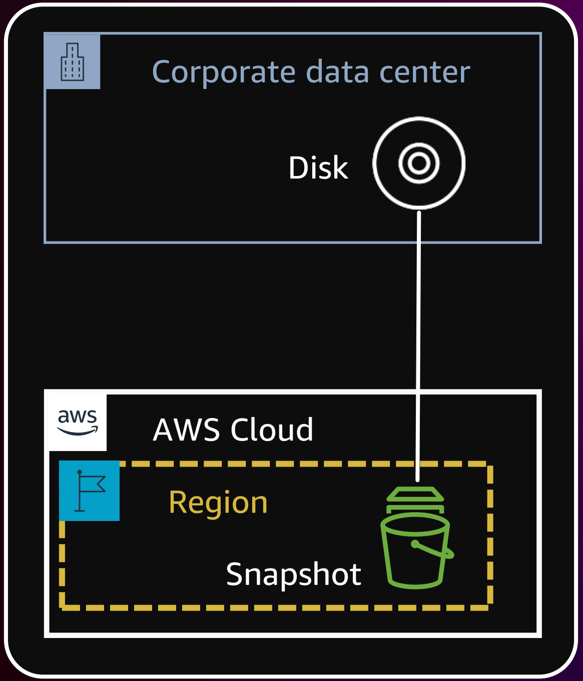
How are snapshots used?



EBS backup and disaster recovery



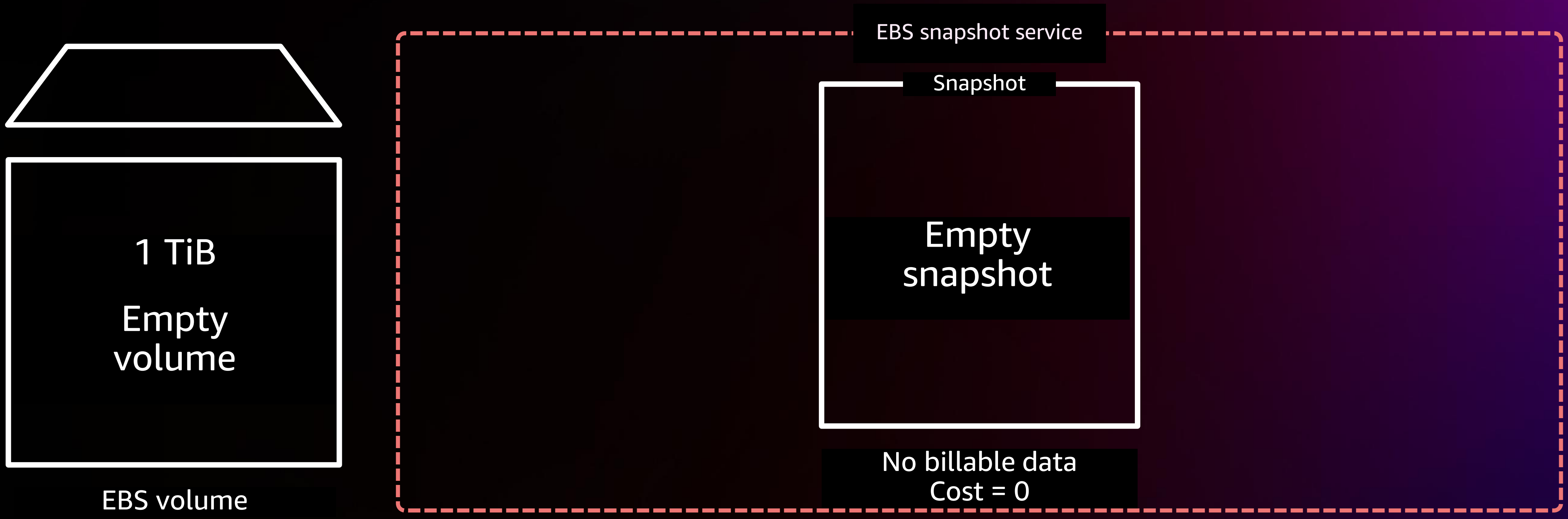
Refresh, scale-up, data handoff workflows



Non-EBS backup and migration

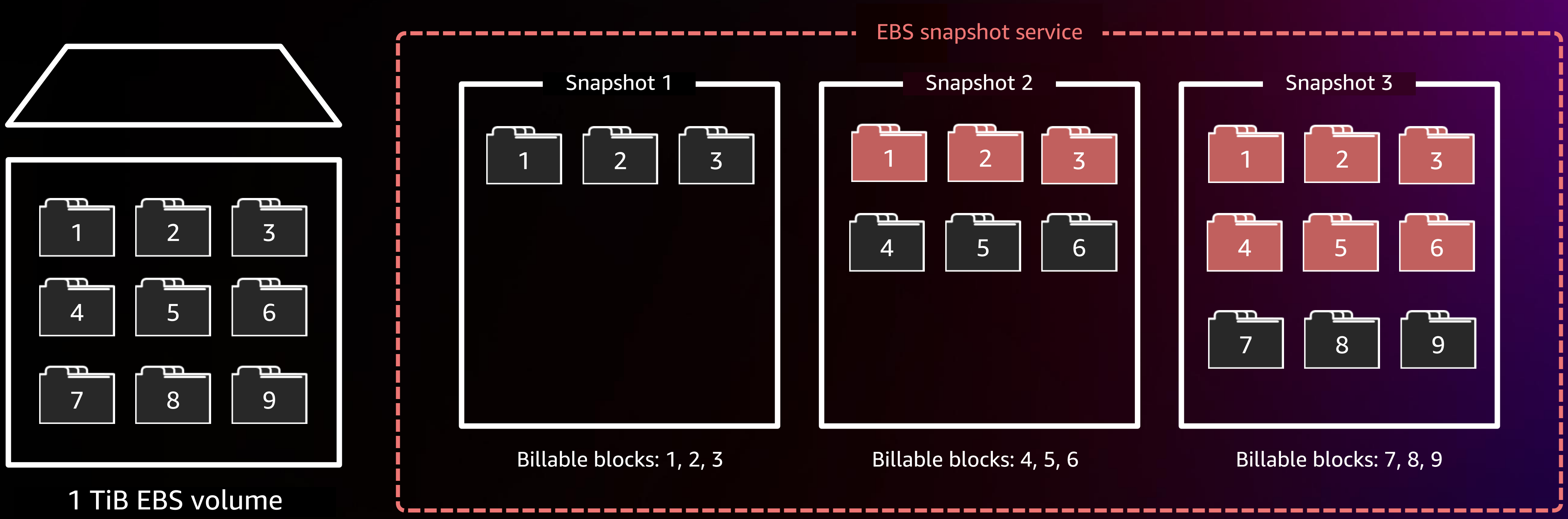
Snapshots basics

How does an EBS snapshot work?



No billable data
Cost = 0

How does an EBS snapshot work?



Key things to remember

EBS snapshots:
Full point-in-time backup

EBS snapshots stored incrementally

EBS snapshots charged for written blocks only

Consistency of snapshots

EBS snapshots are crash consistent

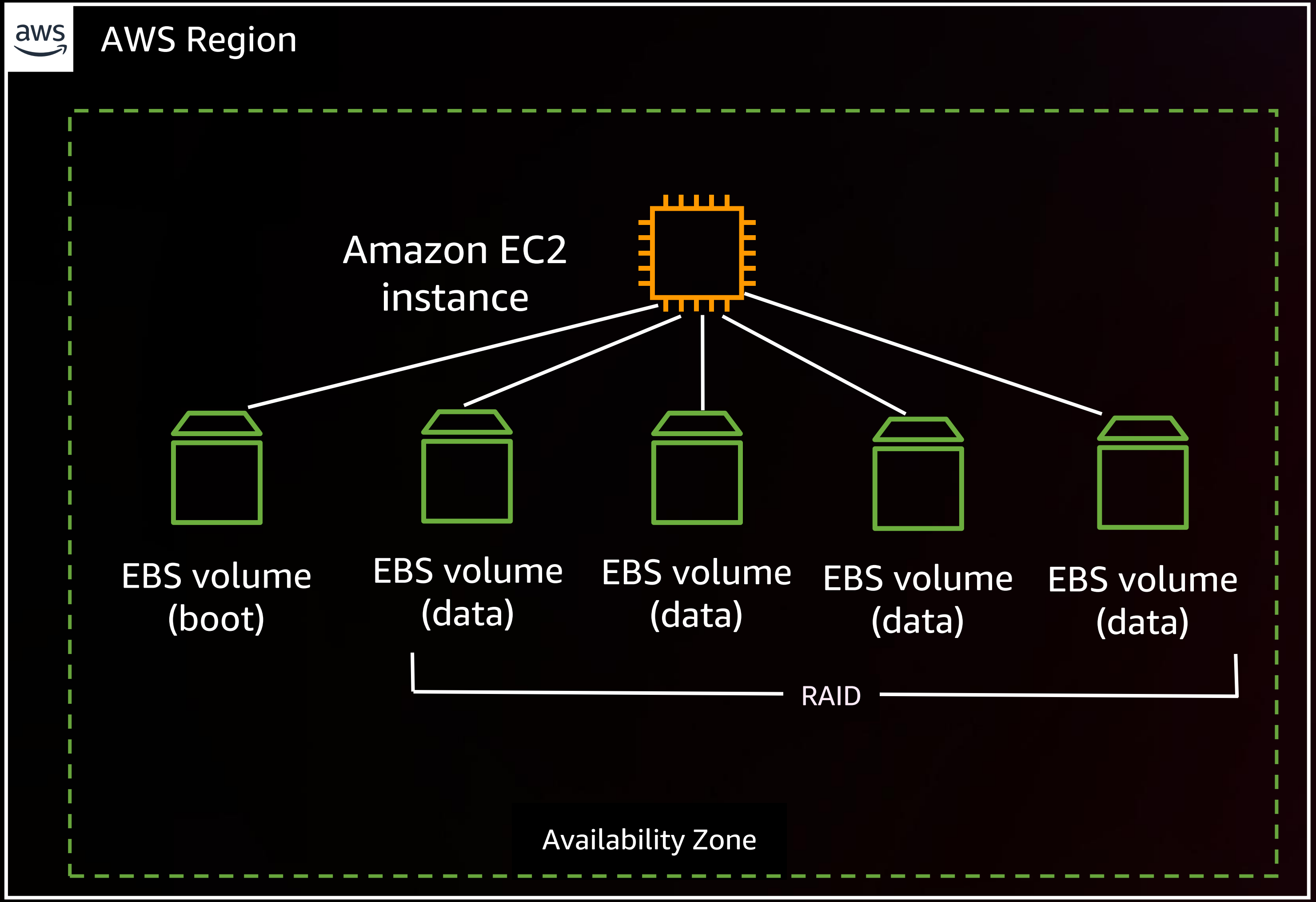
Crash consistency

- Snapshots will contain the blocks of completed I/O operations
- Data not flushed to disk does not exist in the snapshot
- Similar to pulling the power cord of a server

Application consistency

- Application data is flushed to disk prior to snapshot creation
- New writes to application(s) are halted during the snapshot creation process
- Unfreeze/unlock as soon as snapshot creation command is successfully completed

EBS multi-volume, crash-consistent snapshots



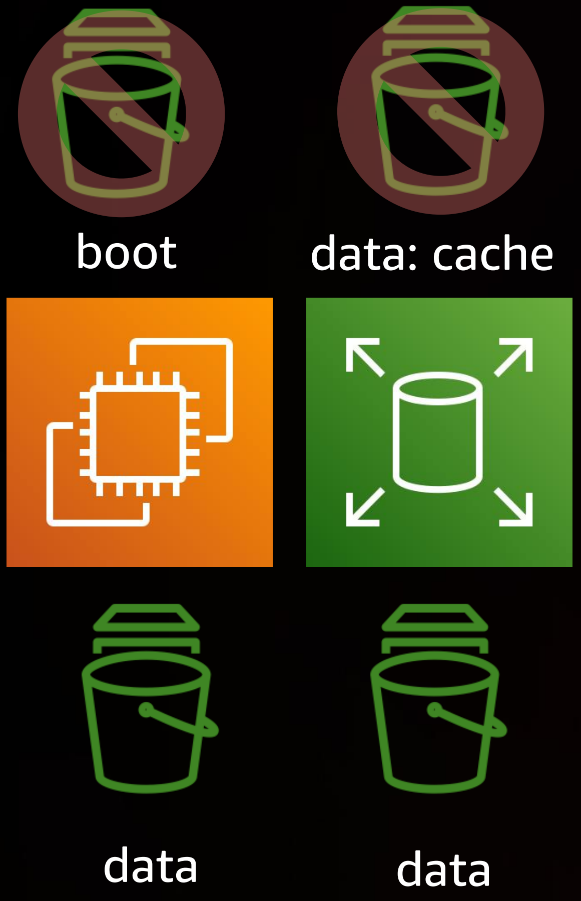
Using the CreateSnapshots API, you can take point-in-time, crash-consistent snapshots across multiple EBS volumes attached to an EC2 instance

Best practice

- Separate boot and data volumes
- Snapshot regularly

https://docs.aws.amazon.com/cli/latest/reference/ec2/create-snapshots.html

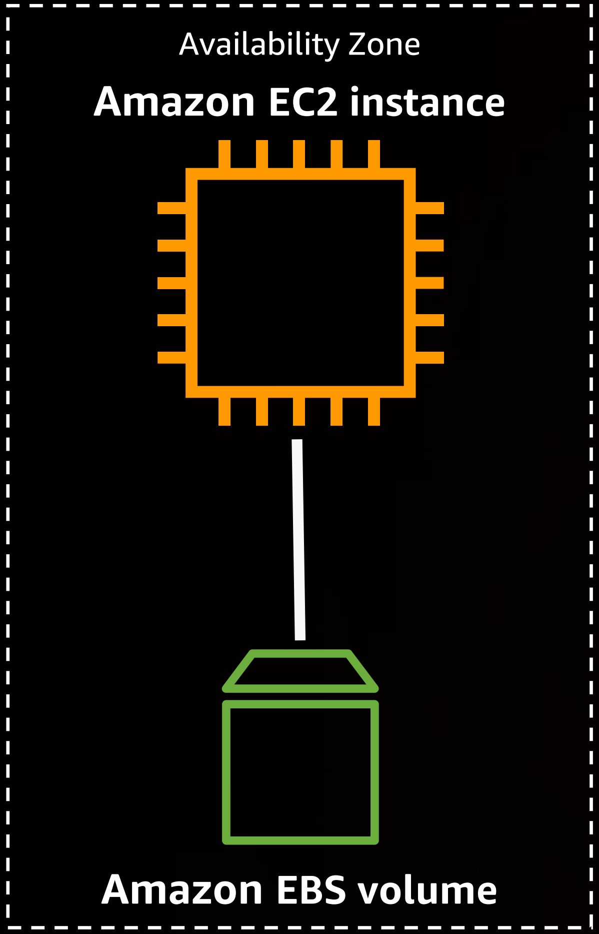
New! Snapshot a subset of data volumes



- **Simple** – replaces multiple API calls with a single CreateSnapshots call
- **Cost-efficient** – only snapshot the multi-attached volumes you select
- **Automated** – set tags in Amazon Data Lifecyle Manager policies to specify which volumes to exclude

EBS snapshot encryption

Encryption – Amazon EBS



- Integrates with AWS KMS – AES-256 encryption
- Encrypted EBS volume implies the following are encrypted
  - **Data at rest** inside the volume
  - **Data moving** between the volume and instance
  - **Snapshots created** from the volume
  - **Volumes created** from such snapshots

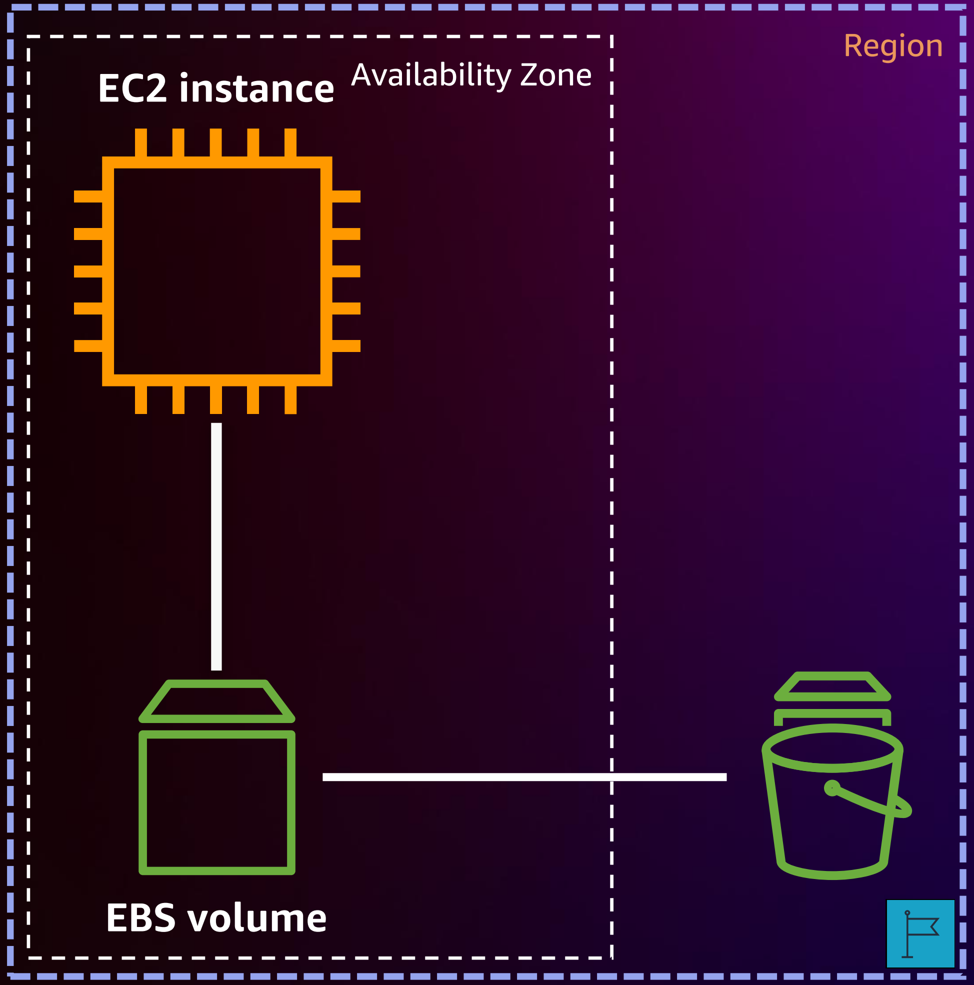
Amazon EBS snapshot encryption

- Snapshots of encrypted volumes are automatically encrypted
- Volumes created from encrypted snapshots are automatically encrypted
- You can encrypt an unencrypted snapshot when you copy a snapshot
- You can re-encrypt a snapshot you own with a different key when you copy a snapshot

https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/EBSEncryption.html

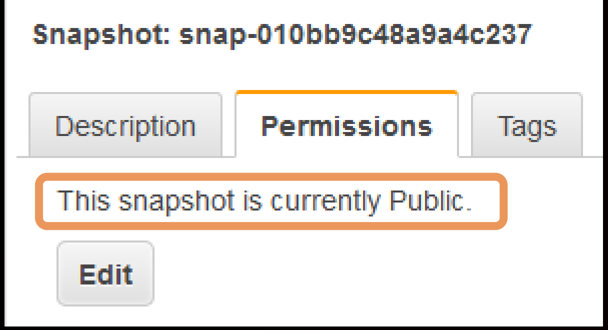
Snapshots can be

- Shared across accounts
- Copied across accounts
- Copied within accounts
- Copied across AWS Regions
- Create AMIs



Best practice for sharing snapshots and AMIs

- Public sharing: Reasonable use case for AMIs – AWS Marketplace AMIs
- Share non-AMI snapshots with specific accounts
- **Within the same Region, you can share snapshots and AMIs without being billed for multiple full snapshots**
- To launch a volumes from a snapshot, a snapshot copy must be in the Region

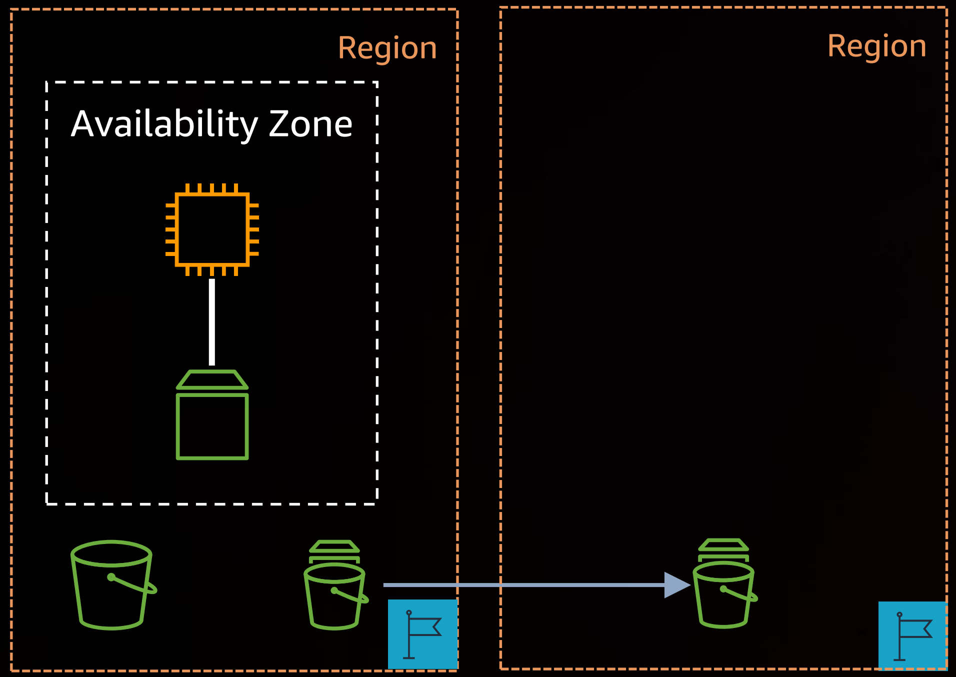


Snapshot: snap-010bb9c48a9a4c237

This snapshot is currently Public.

```
snap-010bb9c48a9a4c237 --attribute createVolumePermission
{
    "SnapshotId": "snap-010bb9c48a9a4c237",
    "CreateVolumePermissions": [
        {
            "Group": "all"
        }
    ]
}
```

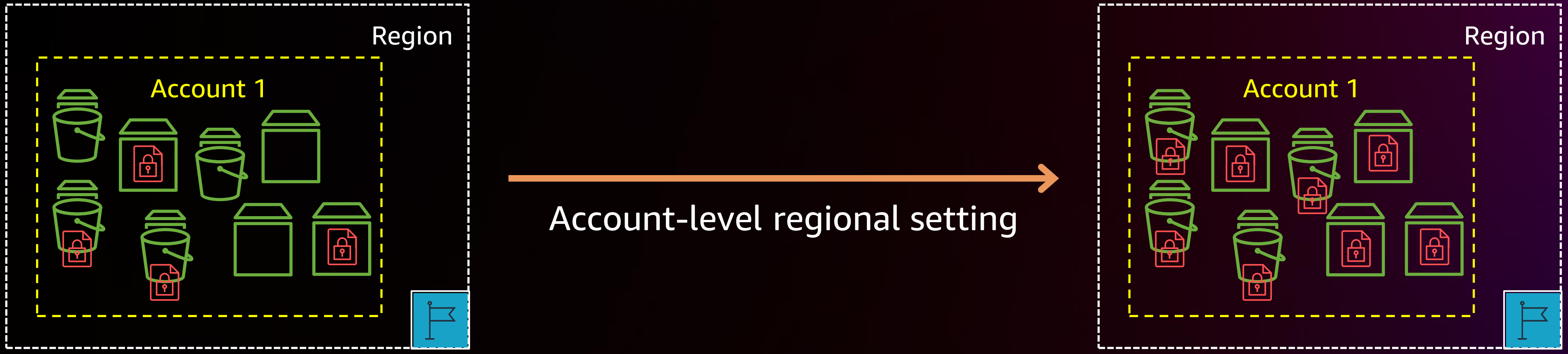
Copy snapshots across Regions



- Copy snapshots across accounts, across Regions
- Lock down resource-level permissions on target snapshot copy
- Multi-Region provides protection against regional events
- Permission lockdown protects against malicious or unintentional deletes of data

How do I enforce encryption?

- EBS encryption by default (EBD) feature
- Enabled on a per account per Region level



Without changing workflows, newly launched volumes + snapshots are encrypted

```
aws ec2 enable-ebs-encryption-by-default
```

Amazon Data Lifecycle Manager (DLM)

Challenges with self-managed solutions

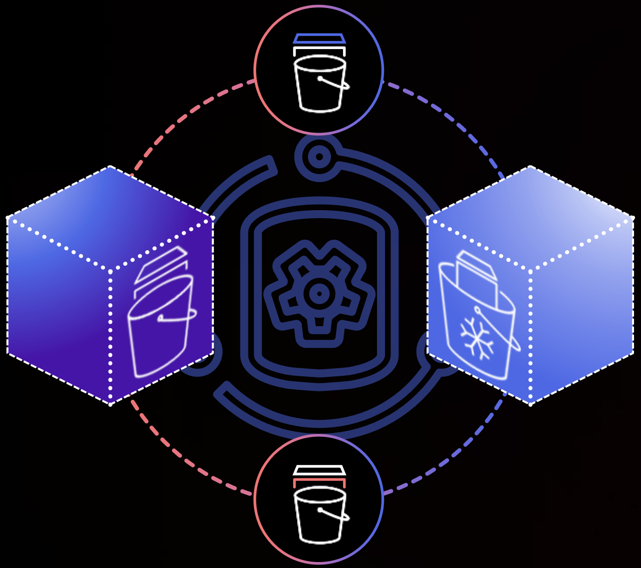
Forgotten snapshots incur additional costs

Scripting bugs lead to under- or over-retention

Multi-schedule snapshots management is challenging

Amazon Data Lifecycle Manager

SIMPLE AUTOMATED WAY TO BACK UP DATA STORED ON AMAZON EBS VOLUMES



Policy- and tag-based backup solution

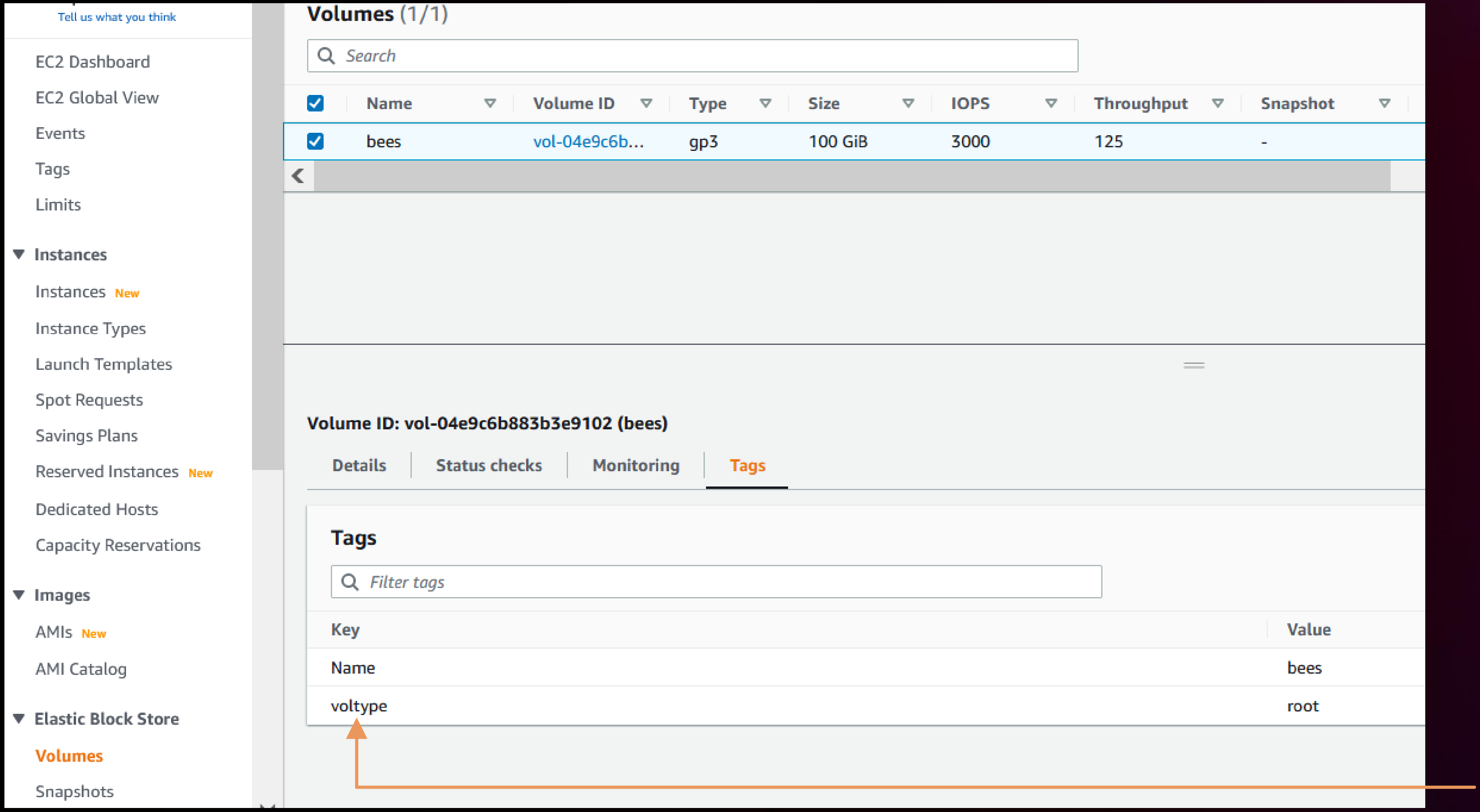
Automated backup scheduling

- Automated backup retention management
- Automated archiving of snapshots

Use AWS Identity and Access Management (IAM) to control policy access

- No cost to use

Amazon Data Lifecycle Manager



Volumes (1/1)

☑	Name	Volume ID	Type	Size	IOPS	Throughput	Snapshot
☑	bees	vol-04e9c6b...	gp3	100 GiB	3000	125	-

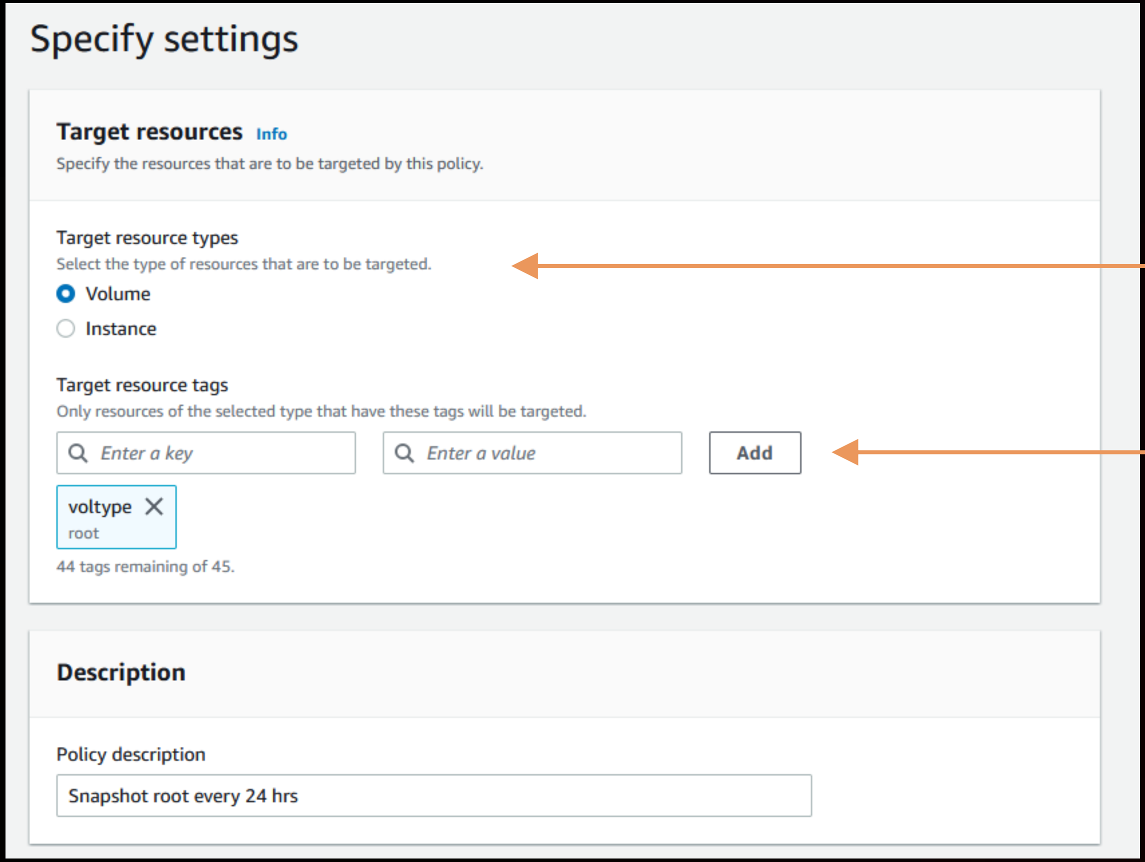
Volume ID: vol-04e9c6b883b3e9102 (bees)

Tags

Key	Value
Name	bees
voltype	root

Add tags to the volumes you want to associate with Amazon Data Lifecycle Manager policies

Amazon Data Lifecycle Manager scheduling features



Specify settings

Target resources Info

Specify the resources that are to be targeted by this policy.

Target resource types

Select the type of resources that are to be targeted.

● Volume

○ Instance

Target resource tags

Only resources of the selected type that have these tags will be targeted.

voltype ✕
root

44 tags remaining of 45.

Description

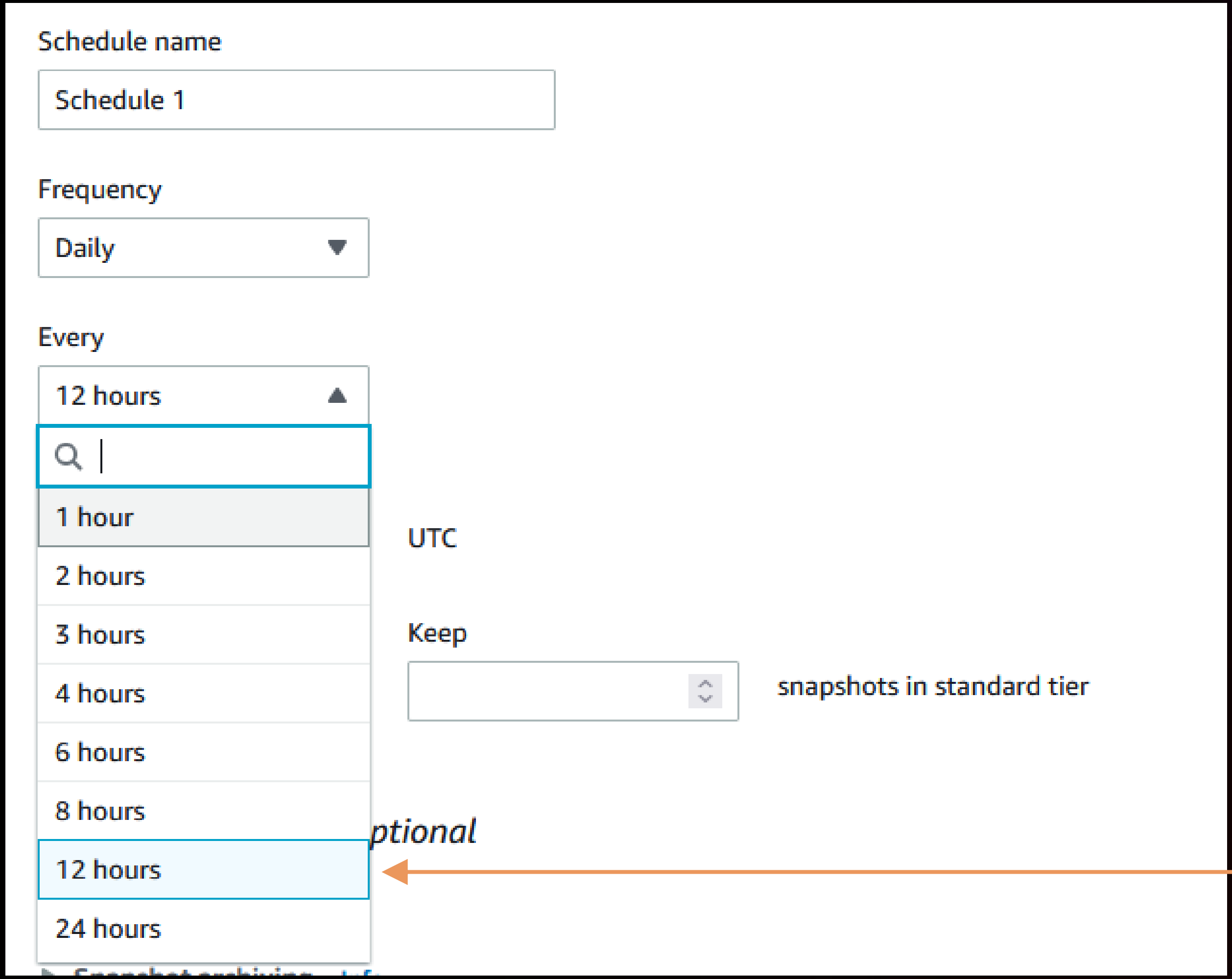
Policy description

Snapshot root every 24 hrs

Select whether to target volumes or instances with the policy

Input the appropriate volume tags to target

Amazon Data Lifecycle Manager scheduling features



Schedule name

Schedule 1

Frequency

Daily ▼

Every

12 hours ▲

UTC

Keep

snapshots in standard tier

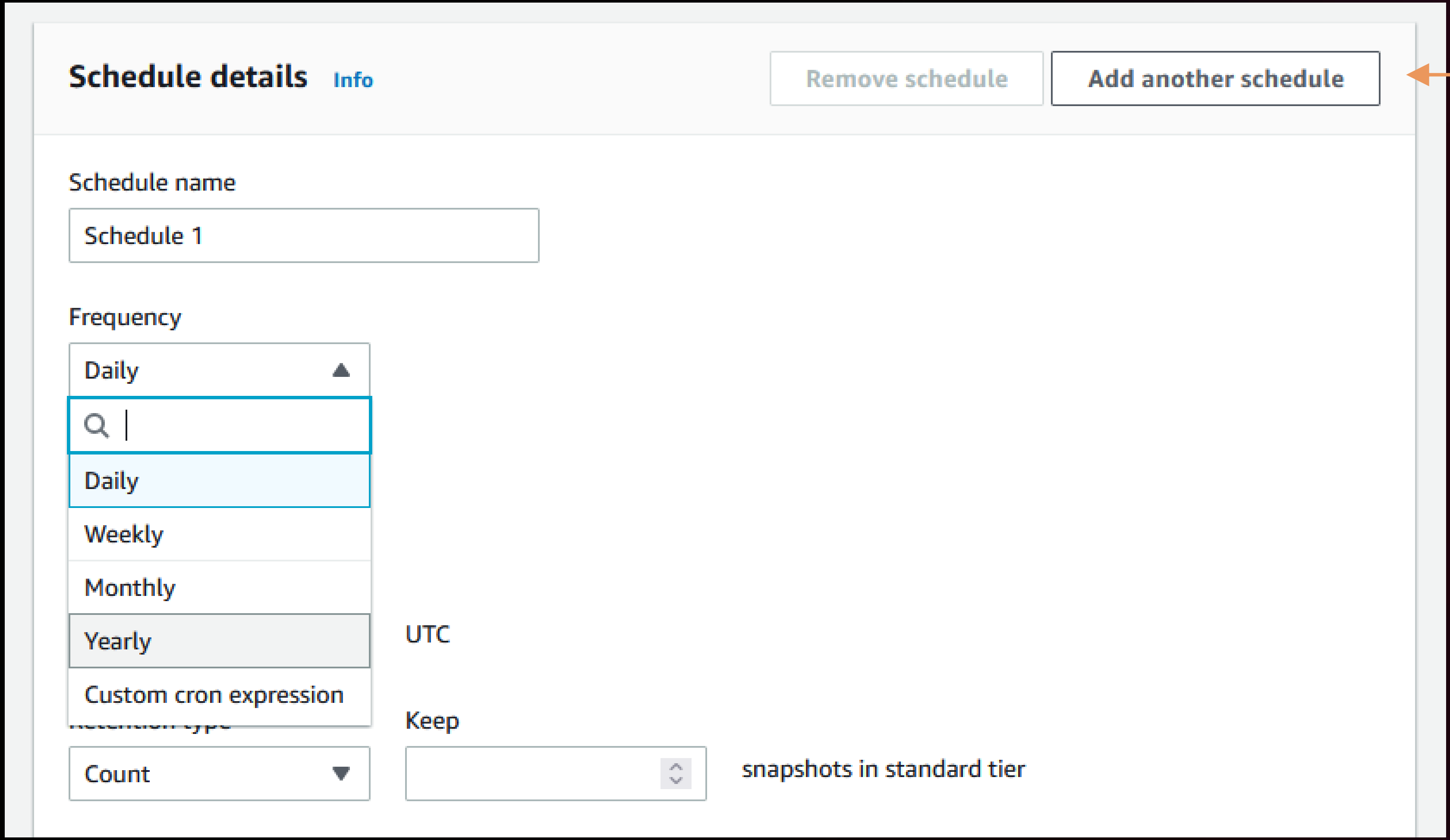
ptional

▶ Snapshot archiving

Reduce RPO on your Amazon Data Lifecycle Manager policy up to **1 hour**

Schedule snapshots from every hour to every 24 hours

Amazon Data Lifecycle Manager scheduling features



Schedule name: Schedule 1

Frequency: Daily

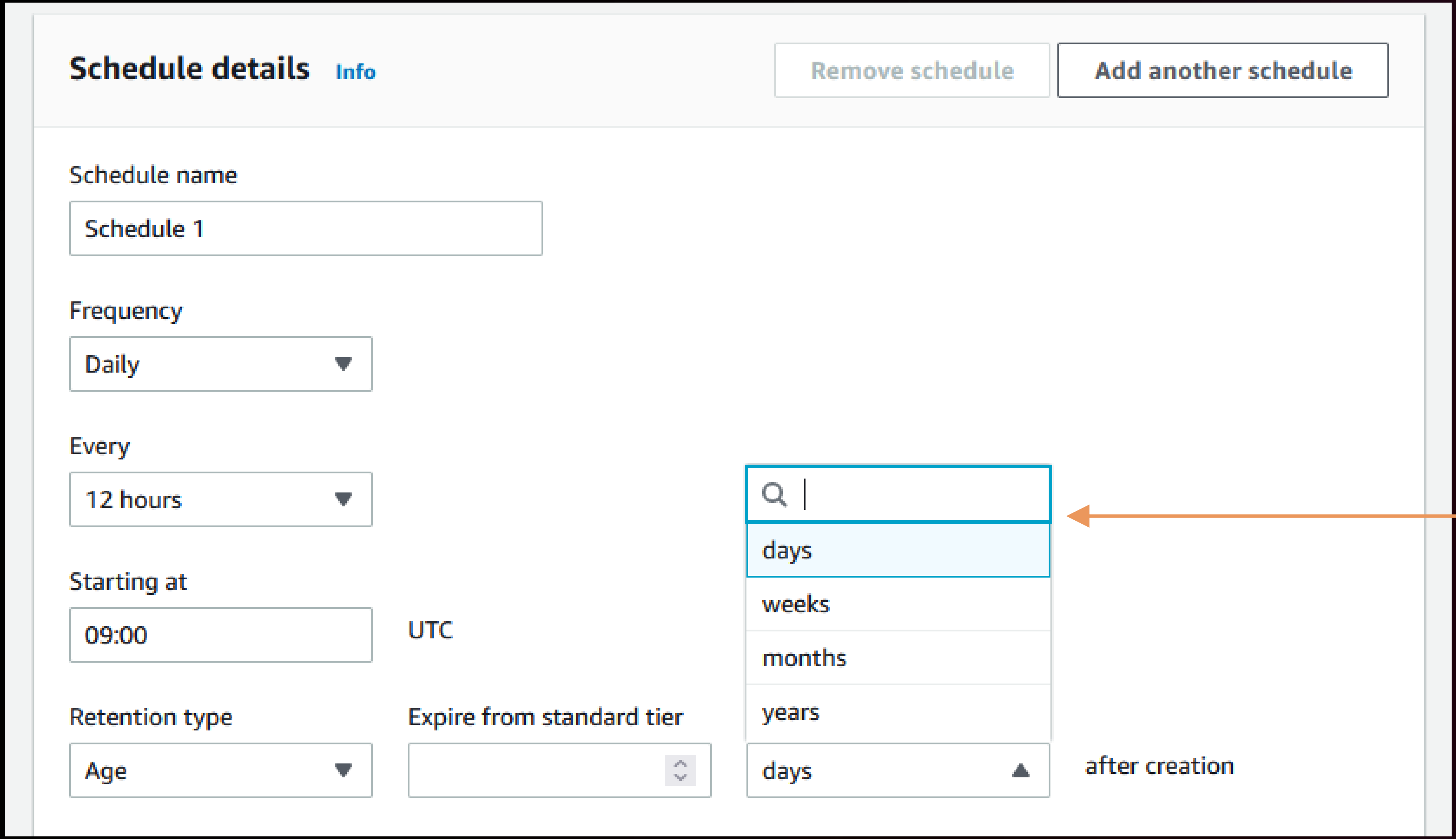
UTC

Retention type: Count

Keep snapshots in standard tier

Define multiple schedules in a single policy

Amazon Data Lifecycle Manager retention features



Schedule name: Schedule 1

Frequency: Daily ▼

Every: 12 hours ▼

Starting at: 09:00 UTC

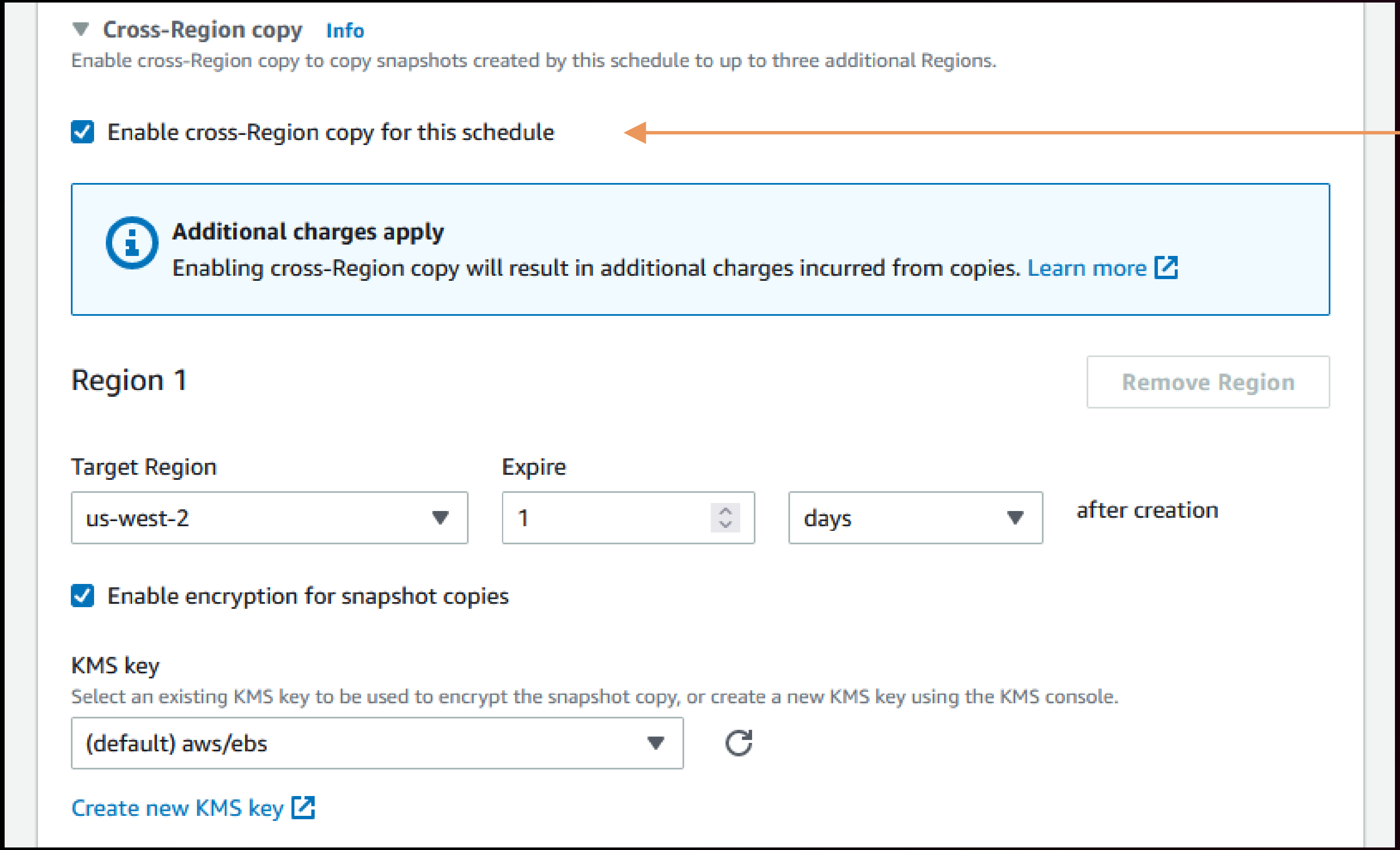
Retention type: Age ▼

Expire from standard tier:

days ▲ after creation

Define retention based on days, weeks, months, or years

Amazon Data Lifecycle Manager cross-Region copy features



▼ Cross-Region copy

Enable cross-Region copy to copy snapshots created by this schedule to up to three additional Regions.

☑ Enable cross-Region copy for this schedule

Additional charges apply

Enabling cross-Region copy will result in additional charges incurred from copies. Learn more

Region 1

Target Region: us-west-2

Expire: 1 days after creation

☑ Enable encryption for snapshot copies

KMS key

Select an existing KMS key to be used to encrypt the snapshot copy, or create a new KMS key using the KMS console.

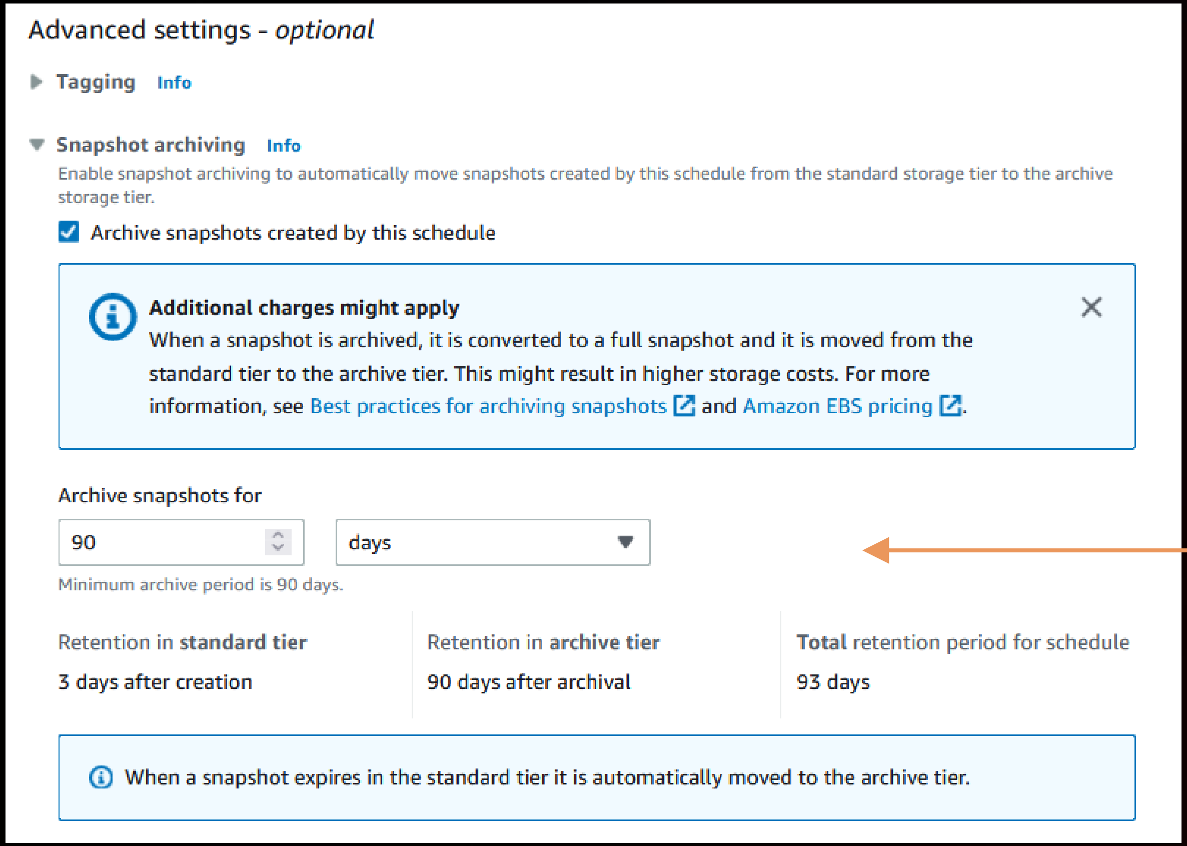
(default) aws/ebs

Create new KMS key

Automate copy across Region

Amazon Data Lifecycle Manager snapshot archive feature

Automatically create and **archive monthly, quarterly, and yearly** snapshots



Advanced settings - *optional*

▶ Tagging Info

▼ Snapshot archiving Info

Enable snapshot archiving to automatically move snapshots created by this schedule from the standard storage tier to the archive storage tier.

☑ Archive snapshots created by this schedule

Additional charges might apply
When a snapshot is archived, it is converted to a full snapshot and it is moved from the standard tier to the archive tier. This might result in higher storage costs. For more information, see Best practices for archiving snapshots and Amazon EBS pricing.

Archive snapshots for

90 days

Minimum archive period is 90 days.

Retention in **standard tier**	Retention in **archive tier**	**Total** retention period for schedule
3 days after creation	90 days after archival	93 days

When a snapshot expires in the standard tier it is automatically moved to the archive tier.

Define retention in archive tier

Recycle Bin for EBS snapshots and AMIs

Causes of accidental snapshot deletion

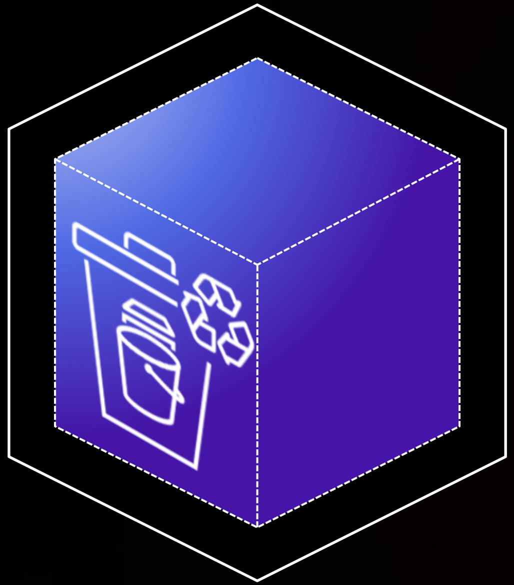
Simple human errors

Scripting bugs

Accidental retention policy change

Recycle Bin for EBS snapshots and AMIs

ALLOWS FOR QUICK RECOVERY OF DELETED SNAPSHOTS AND AMIS



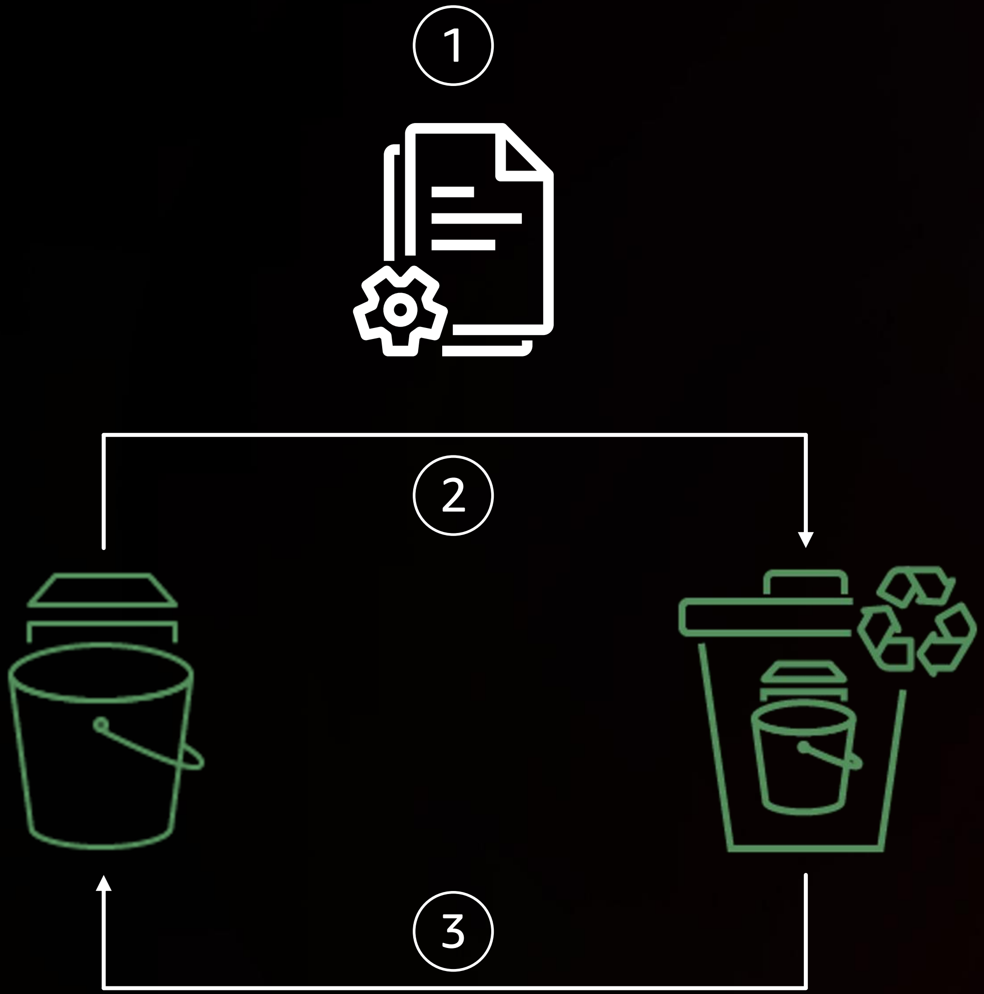
Automatically retain deleted snapshots for a retention period you specify

Use retention rules to specify retention periods for all or some tagged snapshots in your account

Pay EBS snapshot price for snapshots in Recycle Bin

Restrict access to Recycle Bin rules and resources using administrator IAM role

Recycle Bin: How it works



1. Set up retention rules
   a. Account-level rules per Region
   b. Tag-based rules per Region

2. Retain deleted snapshots and AMIs in Recycle Bin

3. Recover deleted snapshots and AMIs before expiry of retention period

AVAILABLE NOW

Introducing Rule Lock for Recycle Bin

PROTECT YOUR RESOURCES FROM ACCIDENTAL OR MALICIOUS DELETION

Lock retention rules to prevent them from being modified or deleted

Protect your EBS snapshots and EC2 AMIs from malicious deletions and account breaches

Maliciously deleted resources are safely retained in the Recycle Bin and can be recovered later

How it works

Create a new locked rule or lock an existing account-level rule

A locked rule can only be unlocked by users with unlock permissions

Unlocked rules stay locked for a configurable period of 7 to 30 days, giving a layer of protection against malicious attempts

EBS Snapshots Archive

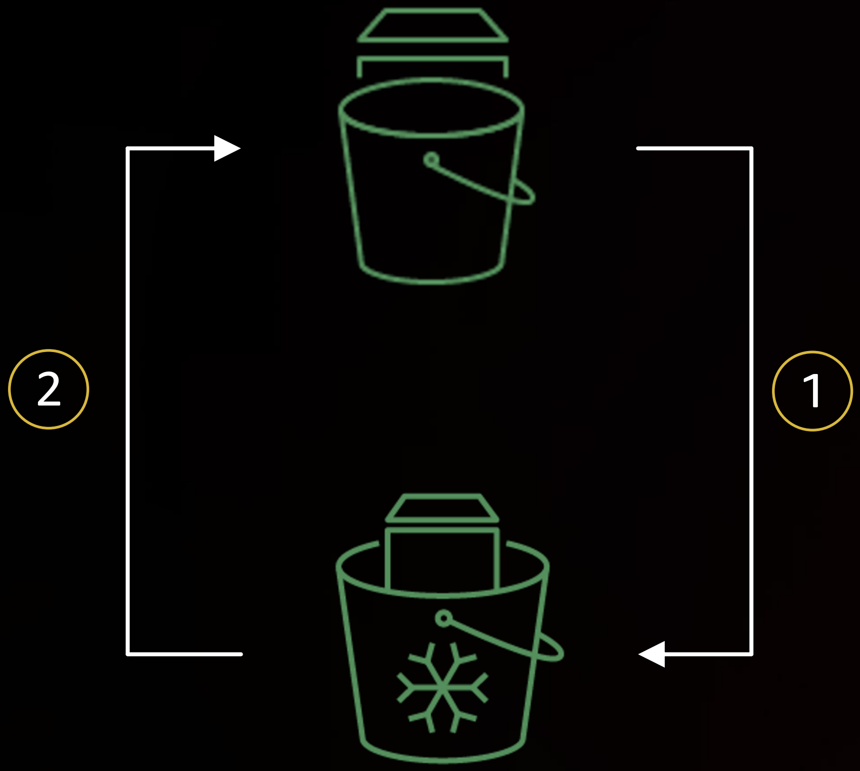
EBS Snapshots Archive tier

- **Long-term snapshot retention**
  - 90-day-minimum retention period
- **Full, point-in-time backups**
- **Retrieve snapshot** before use
  - Retrieval time of hours
- **75% lower storage costs at $0.125/GB-mo.**
  - $0.03/GB additional retrieval charges*

EBS Snapshots Archive tier provides low storage cost for long-term retention of rarely accessed EBS snapshots

*For complete pricing information, visit https://aws.amazon.com/ebs/pricing

EBS Snapshots Archive: How it works



Archive snapshot

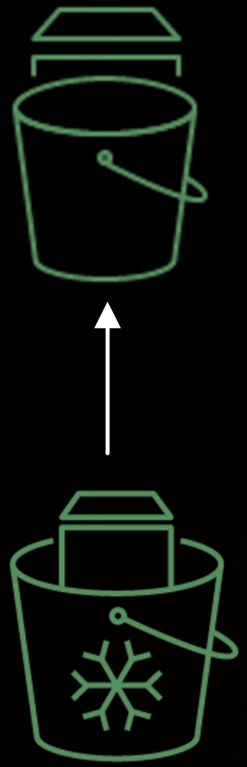
1
- Creates full version of snapshot and moves it into archive tier

Restore snapshot

2
- Restores a full version of your archive snapshot to the EBS Snapshot Standard tier
- Can be temporary or permanent

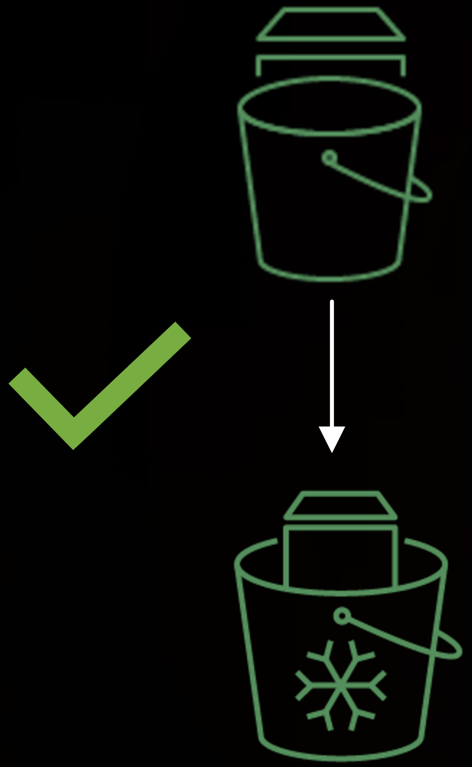
Simple APIs for archiving and restoring snapshots

Restoring snapshots from archive



- **Retrieve snapshot from archive for regular use**
- **Retrieval time of hours**
  - Based on snapshot size (24–72 hours maximum)
- **Temporary restore**
  - Restore temporarily for up to 180 days to standard tier
  - Permanent copy stays in archive tier
- **Permanent restore**
  - Change snapshot tier to standard from archive
  - No copy in archive tier
  - Remember 90-day minimum retention in archive

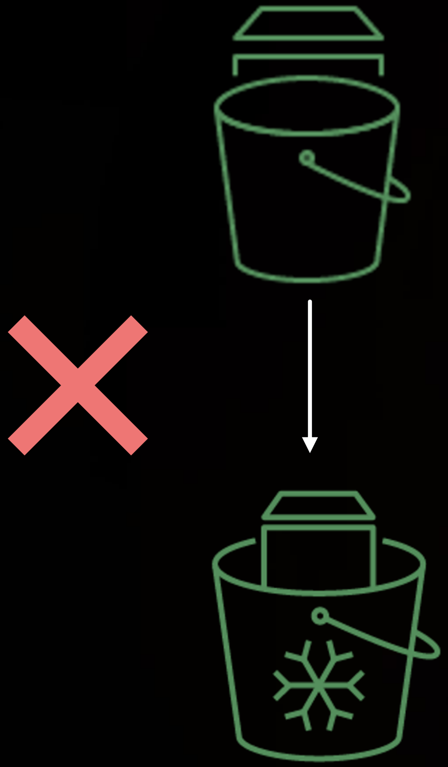
Considerations for archiving snapshots



Which snapshots should you consider archiving?

- Last snapshots of inactive lineages
- Full snapshots for compliance
- Snapshots with >25% change rates

Considerations for archiving snapshots



Which snapshots should you **not** consider archiving?

- Snapshots <25% change rates
- First snapshots of active lineages
- Last snapshots of active lineages

EBS direct APIs

Amazon EBS direct APIs: Read and write access to snapshots

With a set of APIs, you can

Write

Create snapshots from any source

Read

- **List blocks** in a snapshot
- **Read blocks** in parallel
- **Compare** snapshots and **read changed blocks**

Thank you!

Please complete the session survey in the **mobile app**