

AWS Foundation Services

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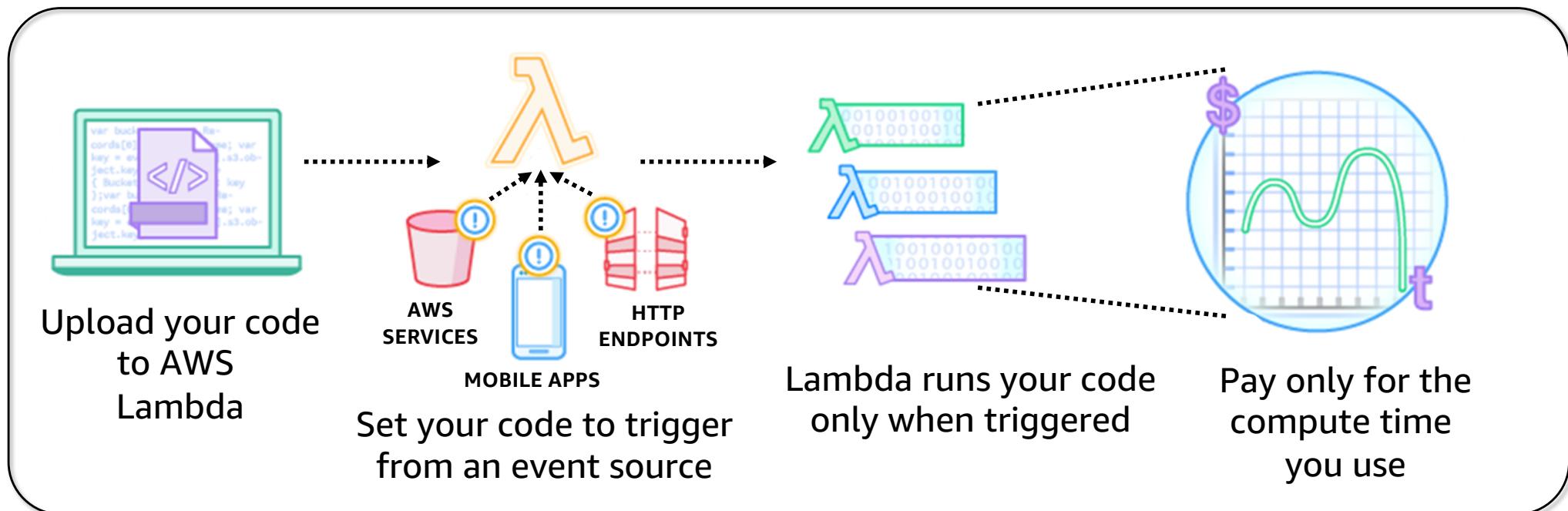
AWS Lambda



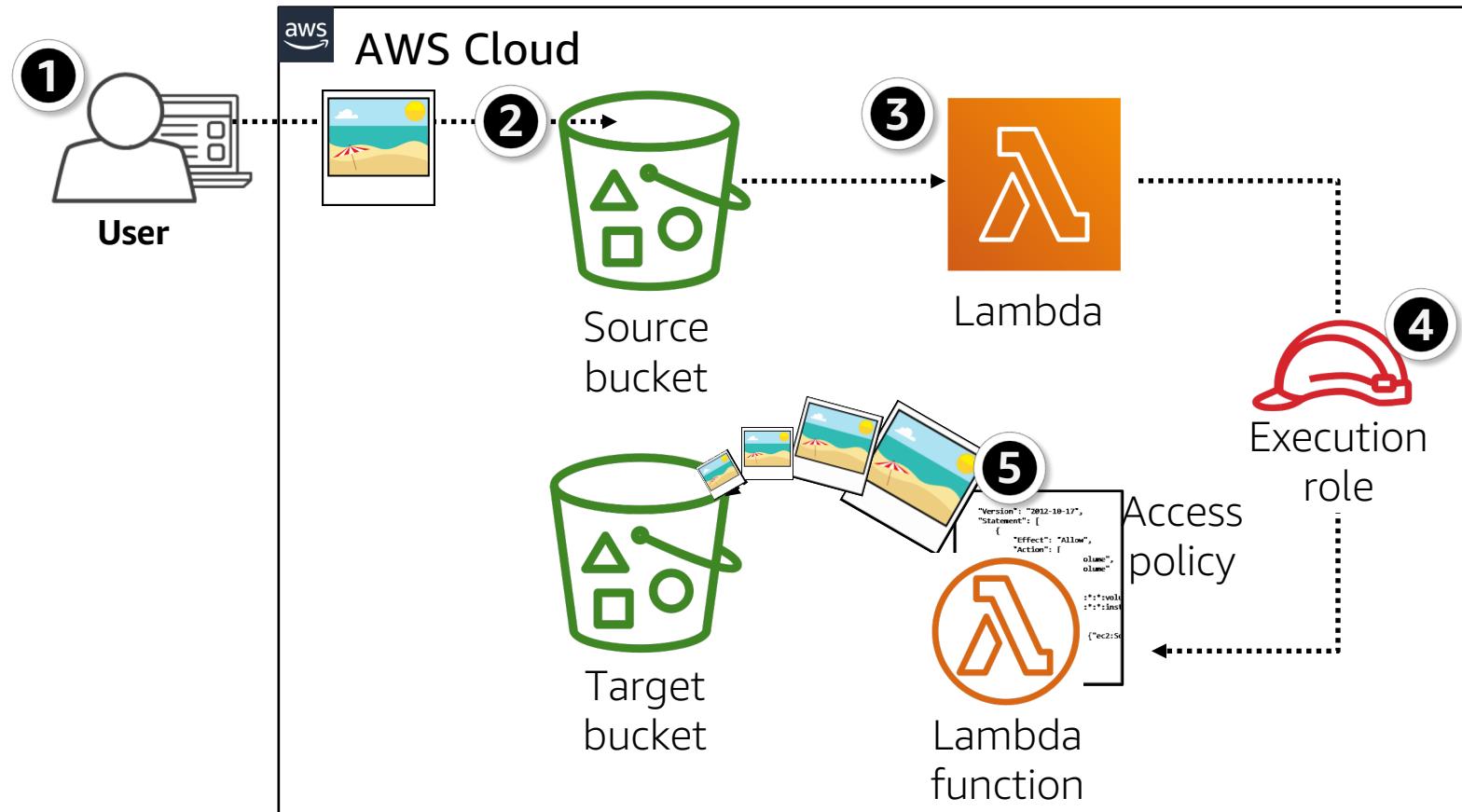
AWS
Lambda

Event-driven that trigger **user-defined code**
Automate the resource management
Fully management, need not user interfere
while running

AWS Lambda: Run code without servers



Lambda example: create thumbnails



Networking - Amazon VPC

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Amazon Virtual Private Cloud (VPC)



Amazon
VPC

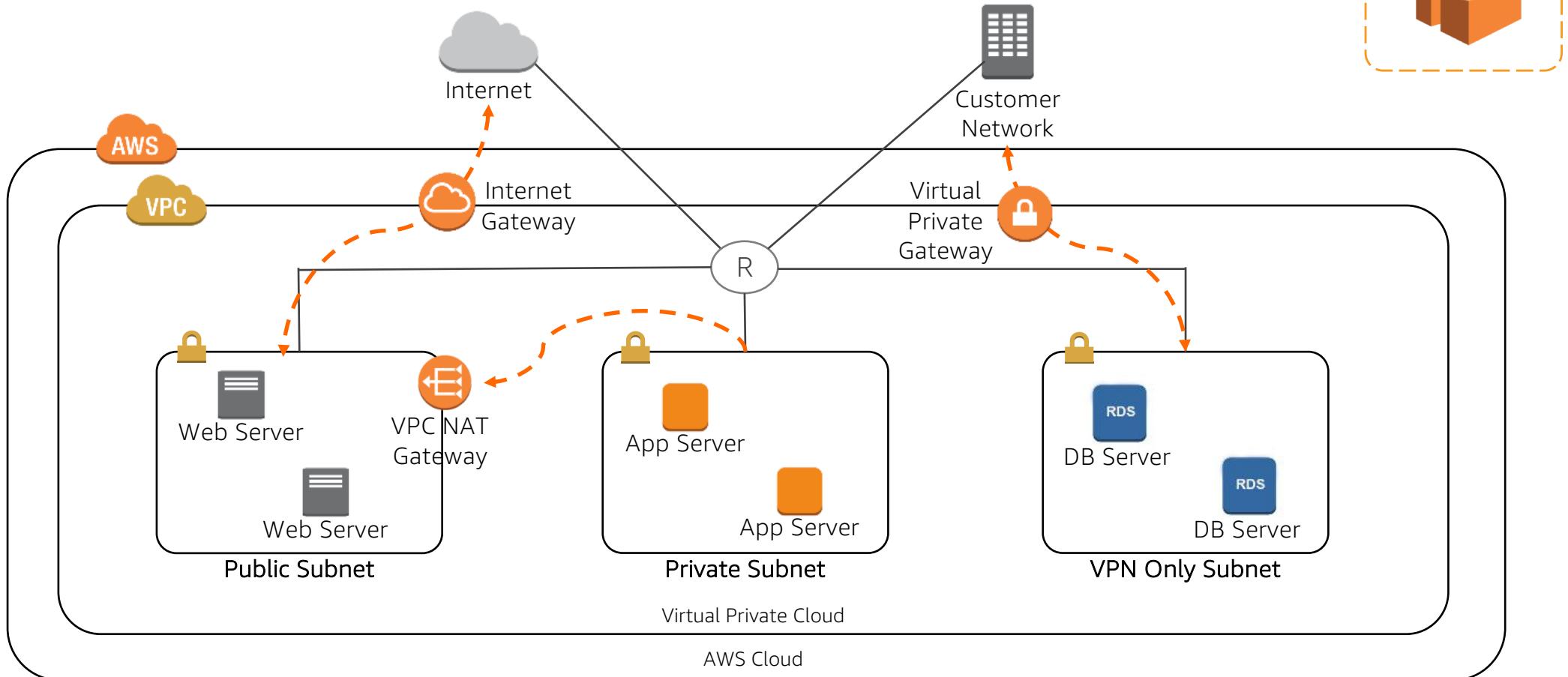
- Provision a **private, isolated virtual network** on the AWS cloud.
- Have complete control over your virtual networking environment.

VPCs and Subnets



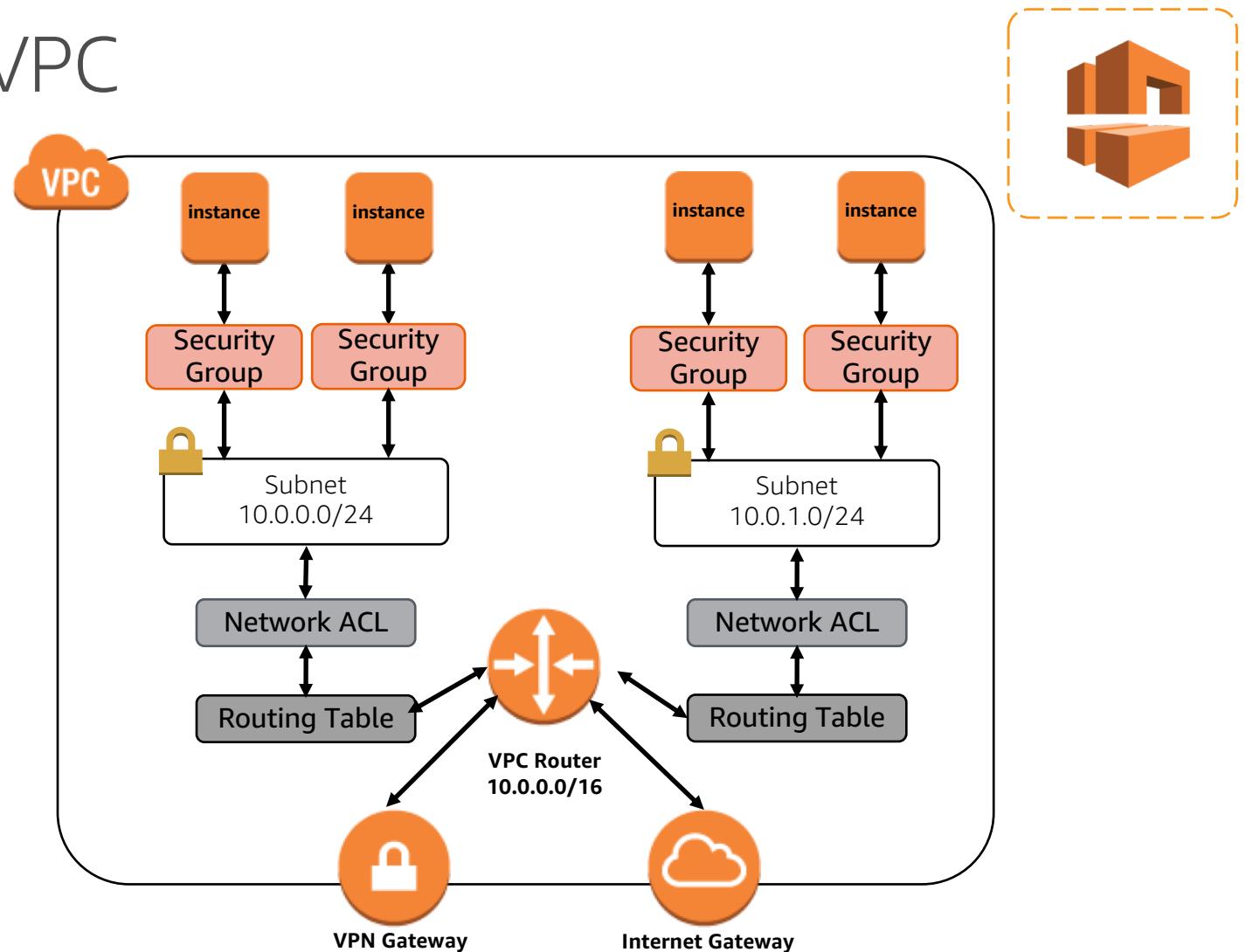
- A **subnet** defines a range of IP addresses in your VPC.
- You can launch AWS resources into a subnet that you select.
- A **private subnet** should be used for resources that won't be accessible over the Internet.
- A **public subnet** should be used for resources that will be accessed over the Internet.
- Each subnet must reside entirely within one Availability Zone and cannot span zones.

Amazon VPC Example



Security in Your VPC

- Security groups
- Network access control lists (ACLs)
- Key Pairs



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Module 2

Storage Service

Amazon S3 and Amazon EBS

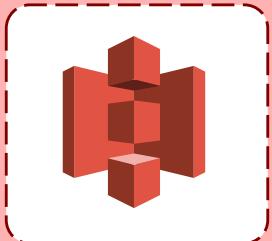
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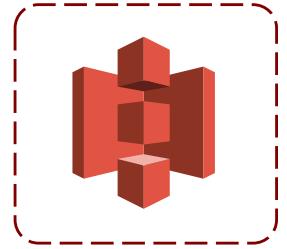
Amazon Simple Storage Service (S3)



Amazon S3

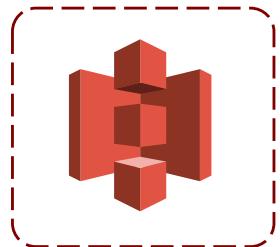
- Storage for the Internet
- Natively online, HTTP access
- Storage that allows you to store and retrieve **any amount of data**, any time, from anywhere on the web
- **Highly scalable**, reliable, fast and durable

Amazon S3 Facts



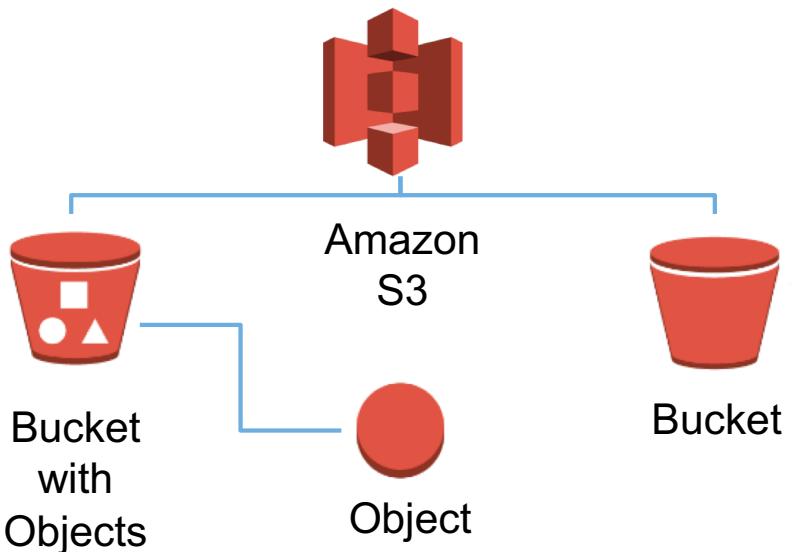
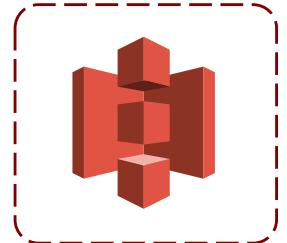
- Can store an **unlimited number of objects** in a bucket
- Objects can be up to 5 TB; no bucket size limit
- Designed for **99.99999999% durability** and 99.99% availability of objects over a given year
- Can use HTTP/S endpoints to store and retrieve any amount of data, at any time, from anywhere on the web
- Is highly scalable, reliable, fast, and inexpensive
- Can use optional server-side encryption using AWS or customer-managed provided client-side encryption
- Auditing is provided by access logs
- Provides standards-based REST and SOAP interfaces

Common Use Scenarios



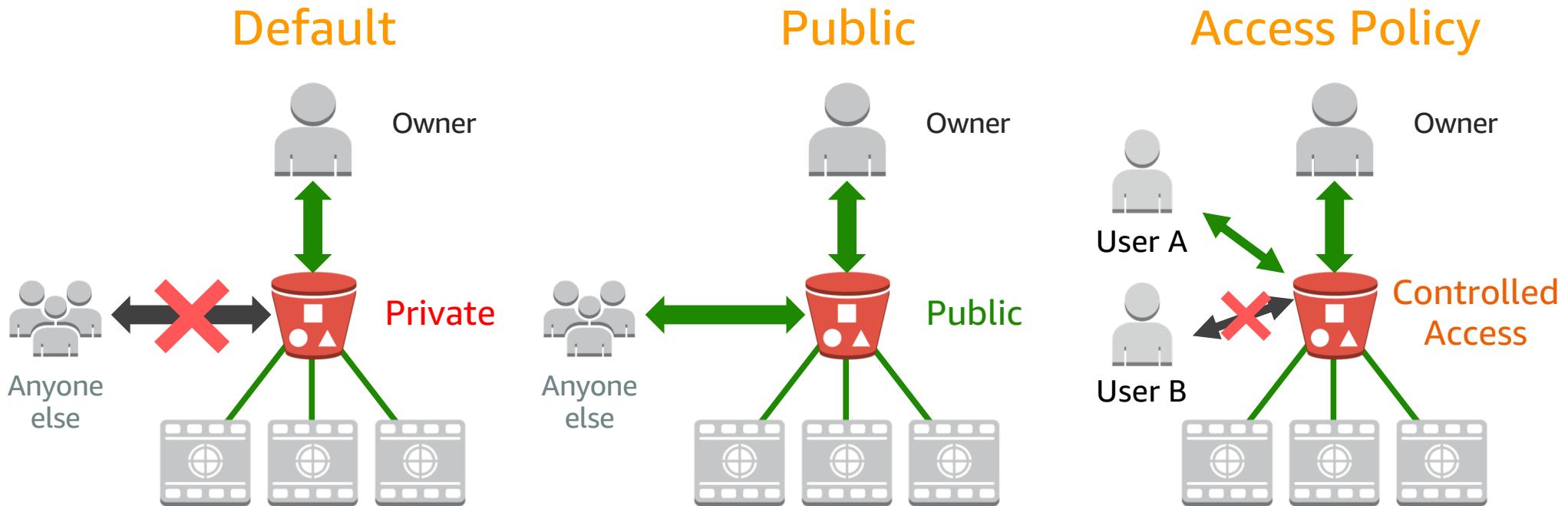
- Storage and backup
- Application file hosting
- Media hosting
- Software delivery
- Store AMIs and snapshots

Amazon S3 Concepts

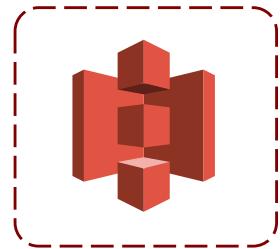


- Amazon S3 stores data as objects within buckets
- An object is composed of a file and optionally any metadata that describes that file
- You can have up to 100 buckets in each account
- You can control access to the bucket and its objects

Amazon S3 Security



Amazon S3 Versioning



- Protects from accidental overwrites and deletes with no performance penalty.
- Generates a new version with every upload.
- Allows easily retrieval of deleted objects or roll back to previous versions.
- Three states of an Amazon S3 bucket
 - Un-versioned (default)
 - Versioning-enabled
 - Versioning-suspended



Versioning Enabled

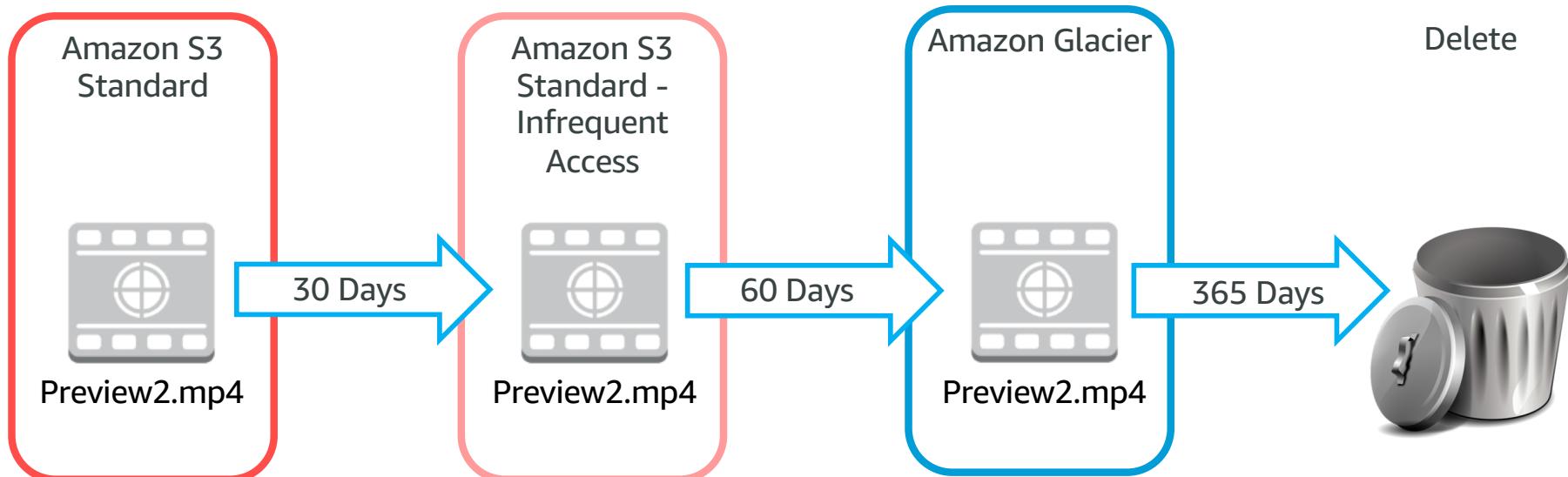


Amazon S3 Storage Classes

| Storage Class | Durability | Availability | Other Considerations |
|---|--------------|---------------------------|---|
| Amazon S3 Standard | 99.99999999% | 99.99% | |
| Amazon S3 Standard - Infrequent Access (IA) | 99.99999999% | 99.9% | <ul style="list-style-type: none">• Retrieval fee associated with objects• Most suitable for infrequently accessed data |
| Glacier | 99.99999999% | 99.99% (once restored) | <ul style="list-style-type: none">• Not available for real-time access• Must restore objects before you can access them• Restoring objects can take 3-5 hours |

S3 Object Lifecycle

Amazon S3 lifecycle policies allow you to delete or move objects based on age.



Instructor Demo – S3

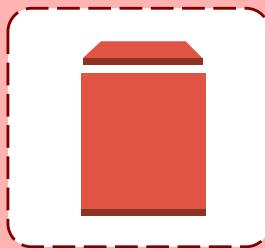
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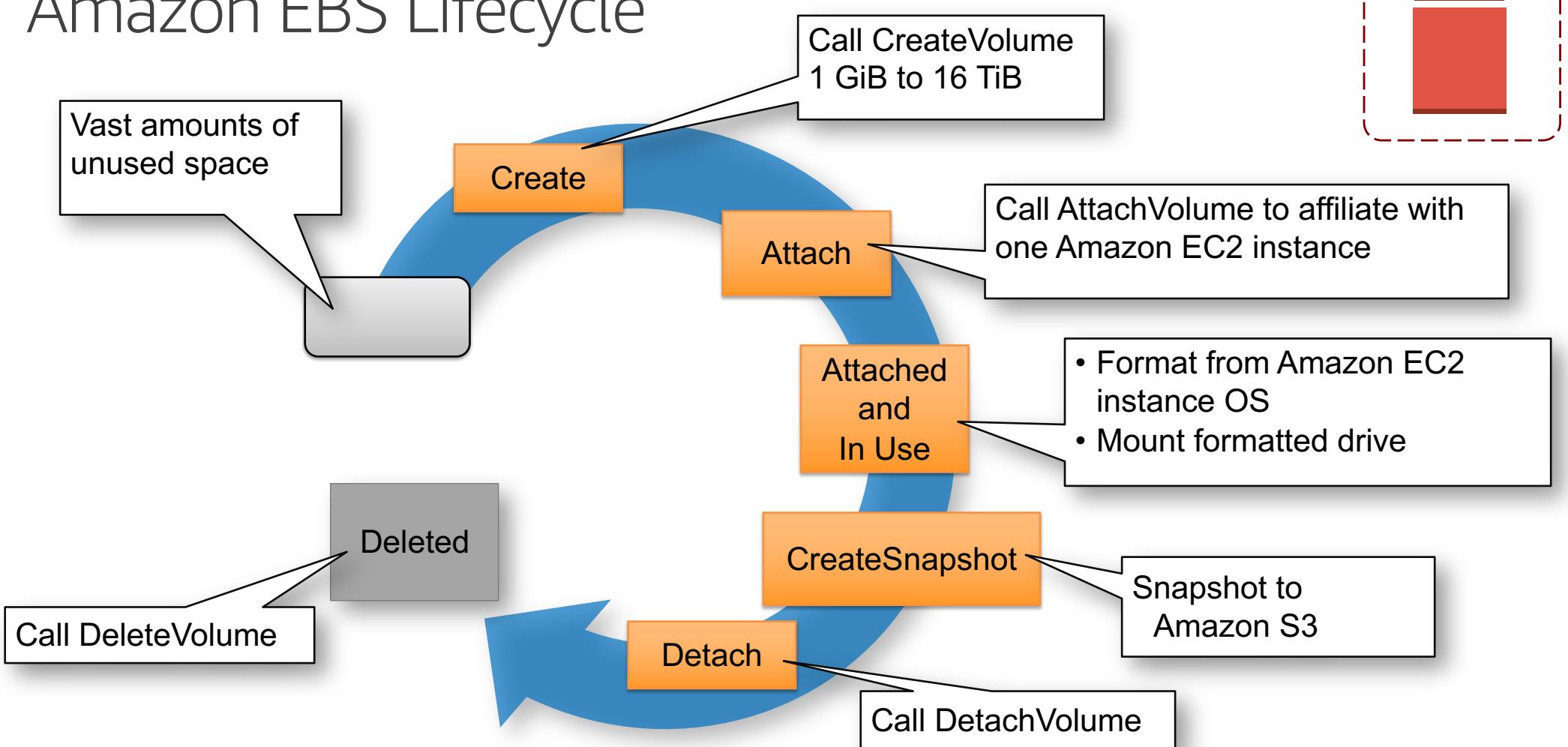
Amazon Elastic Block Store (EBS)



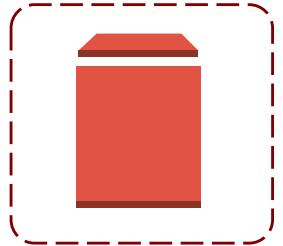
Amazon
EBS

- Persistent block level storage volumes offer consistent and low-latency performance.
- Stored data is automatically replicated within its Availability Zone.
- Snapshots are stored durably in Amazon S3.

Amazon EBS Lifecycle

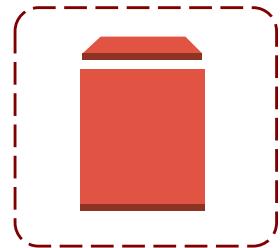


Amazon EBS Volume Types



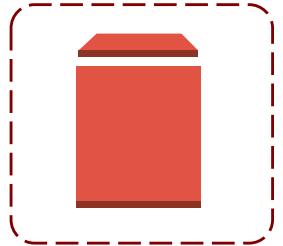
- **SSD-backed volumes** are
 - Optimized for transactional workloads that involve frequent read/write operations with small I/O size.
 - Dominant in IOPS performance.
- **HDD-backed volumes** are
 - Optimized for large streaming workloads.
 - Dominant in throughput (measured in MiB/s).

Amazon EBS Volume Types



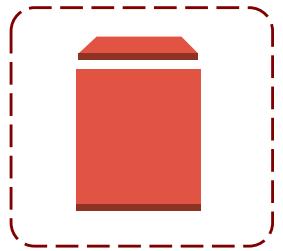
| | SSD | | HDD | |
|--------------------------------|---|--|--|--|
| Volume Type | General Purpose SSD (gp2) | Provisioned IOPS SSD (io1) | Throughput Optimized HDD (st1) | Cold HDD (sc1) |
| Description | Balances price and performance for a wide variety of transactional loads. | Highest-performance SSD volume designed for mission-critical applications. | Low-cost HDD designed for frequently accessed, throughput-intensive workloads. | Lowest cost HDD designed for less frequently accessed workloads. |
| Volume Sizes | 1 GiB – 16 TiB | 4 GiB – 16 TiB | 500 GiB – 16 TiB | 500 GiB – 16 TiB |
| Dominant Performance Attribute | IOPS | IOPS | MiB/s | MiB/s |

Amazon EBS Facts



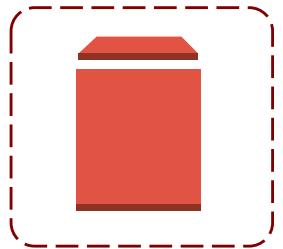
- EBS is recommended when data must be **quickly accessible** and requires long-term **persistence**.
- You can launch your EBS volumes as encrypted volumes – data stored at rest on the volume, disk I/O, and snapshots created from the volume are all encrypted.
- You can create **point-in-time snapshots** of EBS volumes, which are persisted to Amazon S3.

Amazon EBS Use Cases



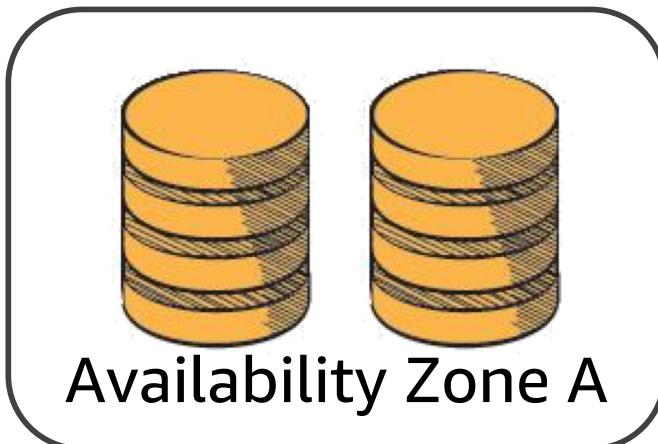
- OS: Use for boot/root volume, secondary volumes
- Databases: Scales with your performance needs
- Enterprise applications: Provides reliable block storage to run mission-critical applications
- Business continuity: Minimize data loss and recovery time by regularly backing up using EBS Snapshots
- Applications: Install and persist any application

Amazon EBS Scope

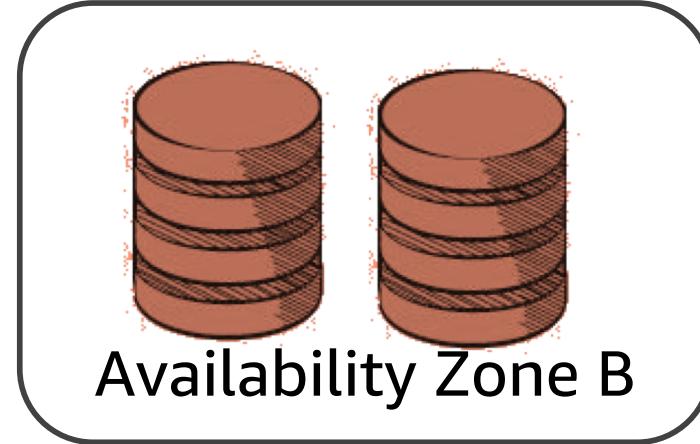


Amazon EBS volumes are in **a single** Availability Zone

EBS Volume 1

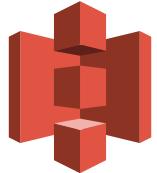


EBS Volume 2



Volume data is replicated across multiple servers in an Availability Zone.

Amazon EBS and Amazon S3



| | Amazon EBS | Amazon S3 |
|---------------------------|---|--|
| Paradigm | Block storage with file system | Object store |
| Performance | Very fast | Fast |
| Redundancy | Across multiple servers in an Availability Zone | Across multiple facilities in a Region |
| Security | EBS Encryption – Data volumes and Snapshots | Encryption |
| Access from the Internet? | No (1) | Yes (2) |
| Typical use case | It is a disk drive | Online storage |

(1) Accessible from the Internet if mounted to server and set up as FTP, etc.

(2) Only with proper credentials, unless ACLs are world-readable