
AWS
re:Invent
NOV. 28 – DEC. 2, 2022 | LAS VEGAS, NV

STG336

Best practices for Amazon S3 replication, featuring HBO Max

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Amazon Web Services

Ian Mc Garry (he/him)

Sr. Manager – Software Development
Amazon Web Services

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Architect, Media Supply Chain
Warner Bros. Discovery

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Agenda

- Amazon S3 Replication
- Building a multi-Region storage architecture with Amazon S3 Replication
- Customer spotlight: Warner Bros. Discovery

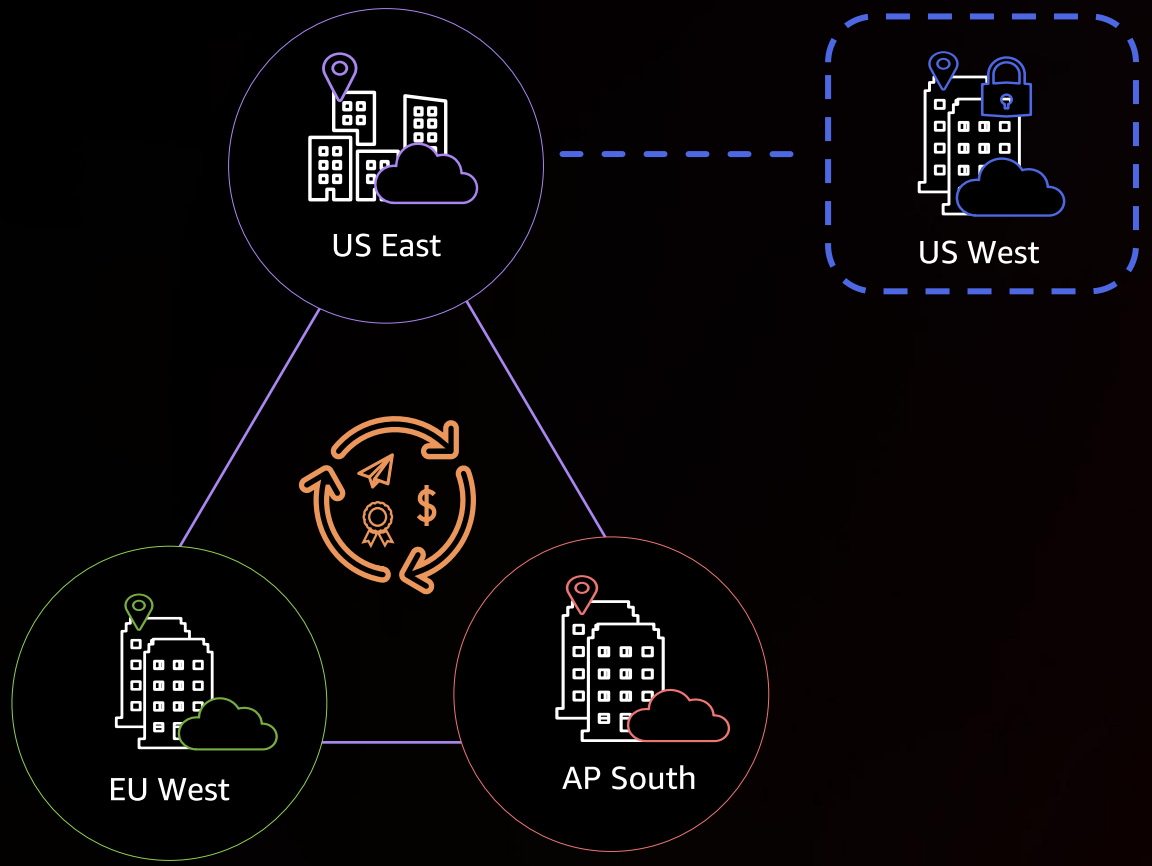
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Customer requirement

Why do customers replicate data?

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Customer requirement



Ensure business continuity

Backup copy of data to recover from disruptions

Minimize access latency

Low latency data access across the globe

Satisfy compliance requirements

Comply with regulatory and data residency requirements

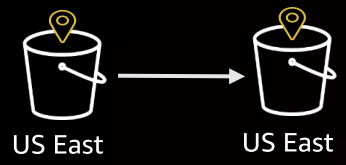
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Amazon S3 Replication

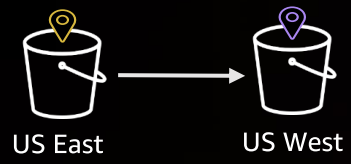
An elastic, fully managed feature to replicate objects between buckets

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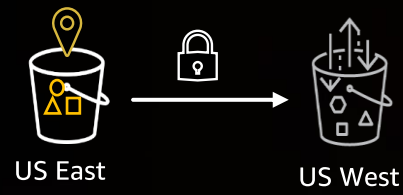
Flexibility



Same Region

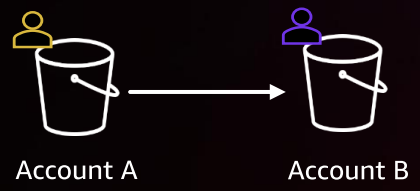


Cross Region

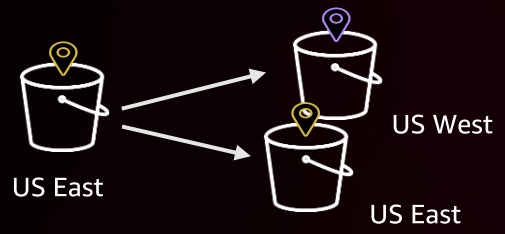


Across storage class, different encryption modes

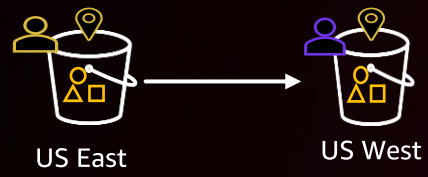
Functionality



Cross-account

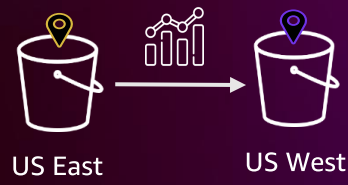


Multi-destination

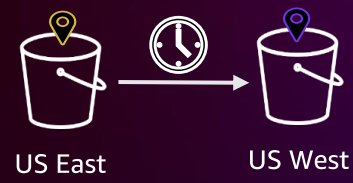


Existing objects

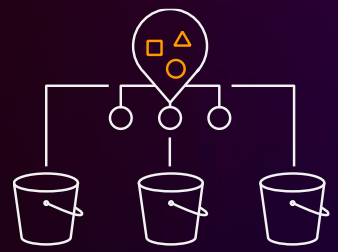
Reliability



Progress tracking



SLA backed



Global endpoint

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Configuring S3 Replication

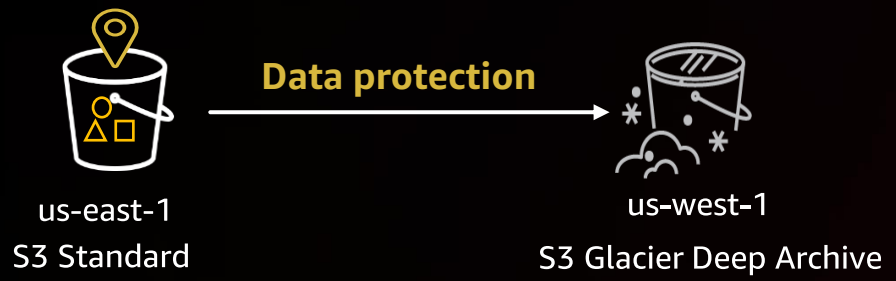


Replication configuration

```
<Rule>
    <ID>data-protection</ID>
    <Priority>0</Priority>
    <Status>Enabled</Status>
    <DeleteMarkerReplication>
            <Status>Disabled</Status>
    </DeleteMarkerReplication>
    <Filter/>
    <Destination>
            <Bucket>arn:aws:s3:::my-us-west-1-bucket
            </Bucket>
    </Destination>
</Rule>
```

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Configuring S3 Replication

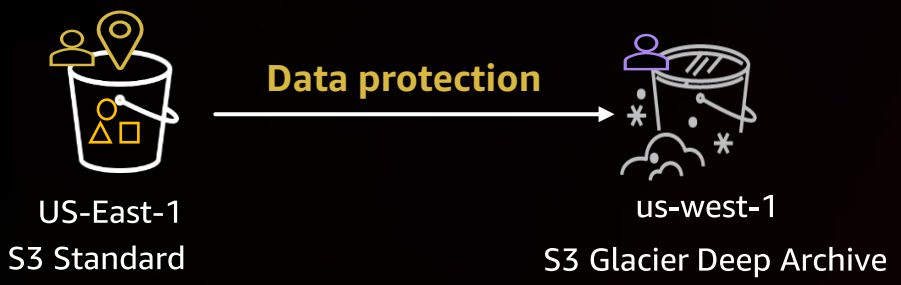


Replication configuration

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<Rule>
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     <Priority>0</Priority>
     <Status>Enabled</Status>
     <DeleteMarkerReplication>
          <Status>Disabled</Status>
     </DeleteMarkerReplication>
     <Filter/>
     <Destination>
          <Bucket>arn:aws:s3:::my-us-west-1-bucket
          </Bucket>
          <StorageClass>DEEP_ARCHIVE</StorageClass>
     </Destination>
</Rule>
```

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Configuring S3 Replication

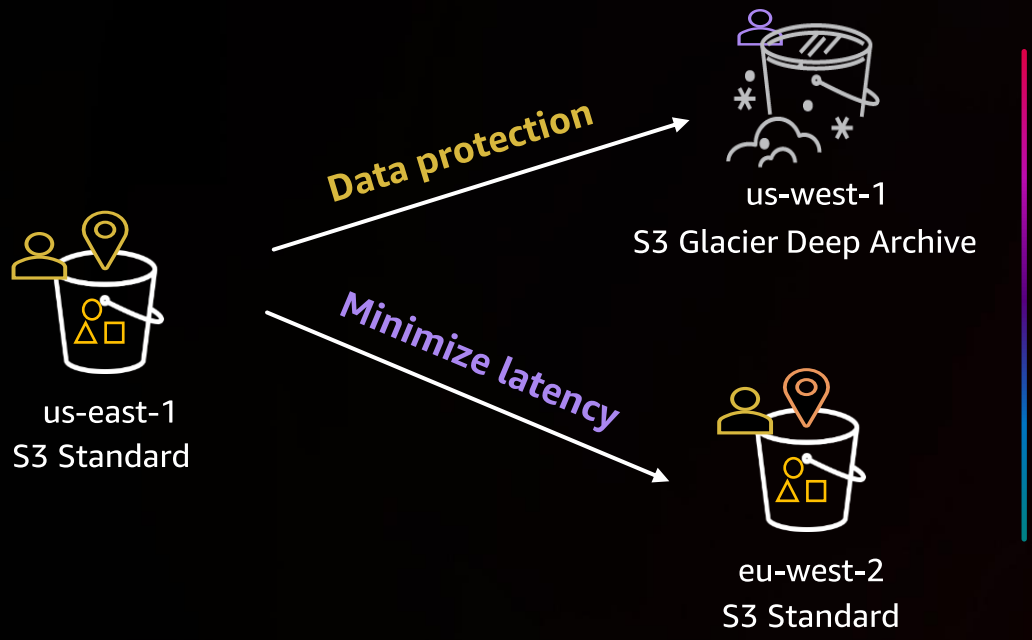


Replication configuration

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      <Priority>0</Priority>
      <Status>Enabled</Status>
      <DeleteMarkerReplication>
                              <Status>Disabled</Status>
      </DeleteMarkerReplication>
      <Filter/>
      <Destination>
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            bucket-cross-account
            </Bucket>
            <Account>123456789101</Account>
      <StorageClass>DEEP_ARCHIVE</StorageClass>
      </Destination>
</Rule>
```

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Configuring S3 Replication



Replication configuration

```
<Rule>
        <ID>data-protection</ID>
        <Priority>0</Priority>
        <Status>Enabled</Status>
        <DeleteMarkerReplication>
              <Status>Disabled</Status>
        </DeleteMarkerReplication>
        <Filter/>
        <Destination>
              <Bucket>arn:aws:s3:::my-us-west-1-bucket-cross-account
              </Bucket>
        <Account>123456789101</Account>
        <StorageClass>DEEP_ARCHIVE</StorageClass>
        </Destination>
</Rule>
<Rule>
        <ID>minimize-latency</ID>
        <Priority>1</Priority>
        <Status>Enabled</Status>
        <DeleteMarkerReplication>
              <Status>Disabled</Status>
        </DeleteMarkerReplication>
        <Filter/>
        <Destination>
              <Bucket>arn:aws:s3:::my-eu-west-2-bucket
             </Bucket>
         </Destination>
</Rule>
```

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S3 Batch Replication

Replicate existing objects from S3 buckets

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S3 Batch Replication

REPLICATE EXISTING OBJECTS



Region expansion
Backfill existing data in a new AWS Region



Data migration
Manage and protect data by migrating to new AWS Region



Re-replicate objects
Re-replicate previously replicated objects, or existing replicas

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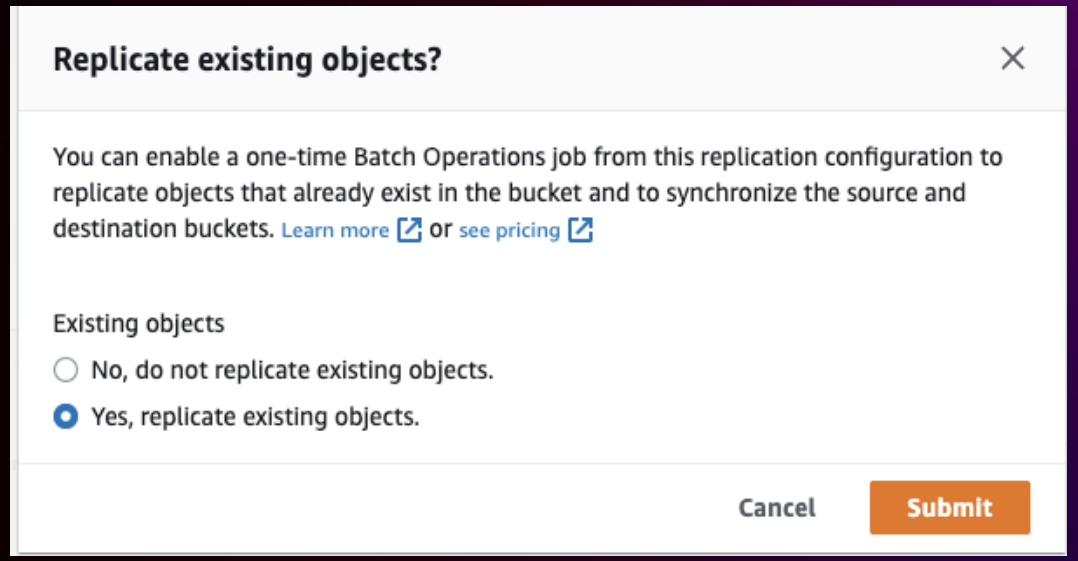
S3 Batch Replication

TWO WAYS TO CONFIGURE BATCH REPLICATION

1

As a Part of Replication Setup

Last step of replication setup,
useful for **bootstrapping a replica**



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S3 Batch Replication

TWO WAYS TO CONFIGURE BATCH REPLICATION

2

As a an Ad-hoc Operation

Configured from scratch,
useful for **one-time data movement**

1. Save the Batch Replication manifest
2. Store the completion report
3. Create or choose an existing IAM Role

Note: *Destination buckets, as well as replication options are defined by the replication configuration on the source bucket.*

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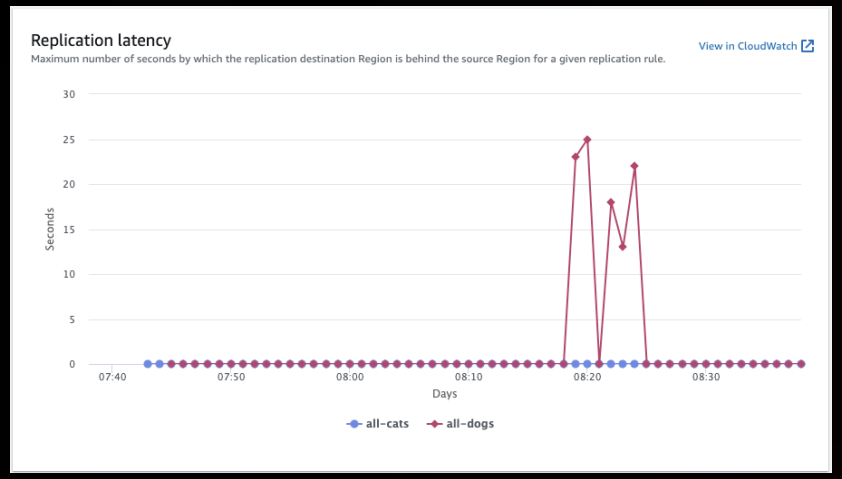
Monitor replication progress

Track minute-by-minute progress while replicating new objects

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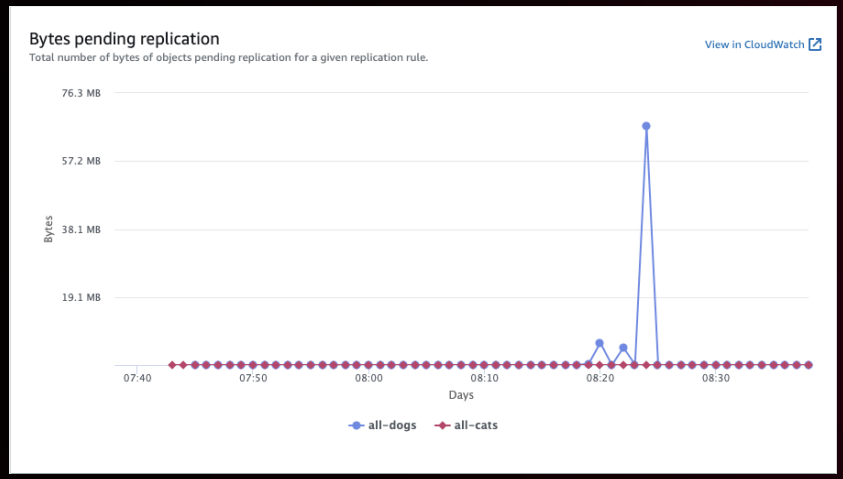
Monitor replication progress

S3 REPLICATION METRICS ON S3 CONSOLE AND ON AMAZON CLOUDWATCH



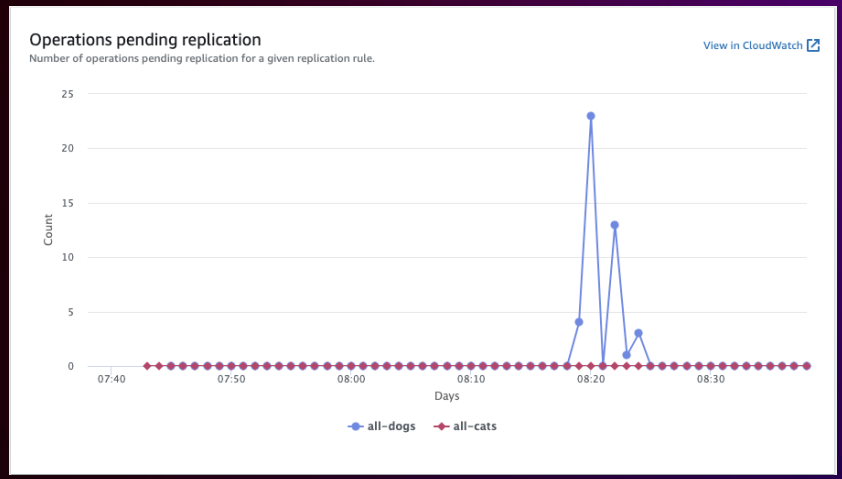
Replication latency

Maximum number of seconds by which destination is behind source



Bytes pending replication

Total bytes pending replication from source to destination



Operations pending replication

Total number of operations pending replication from source to destination

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Predictable replication with S3 RTC

REPLICATE OBJECTS WITHIN 15 MINUTES



Predictable replication time

Replicate objects within 15 mins of upload



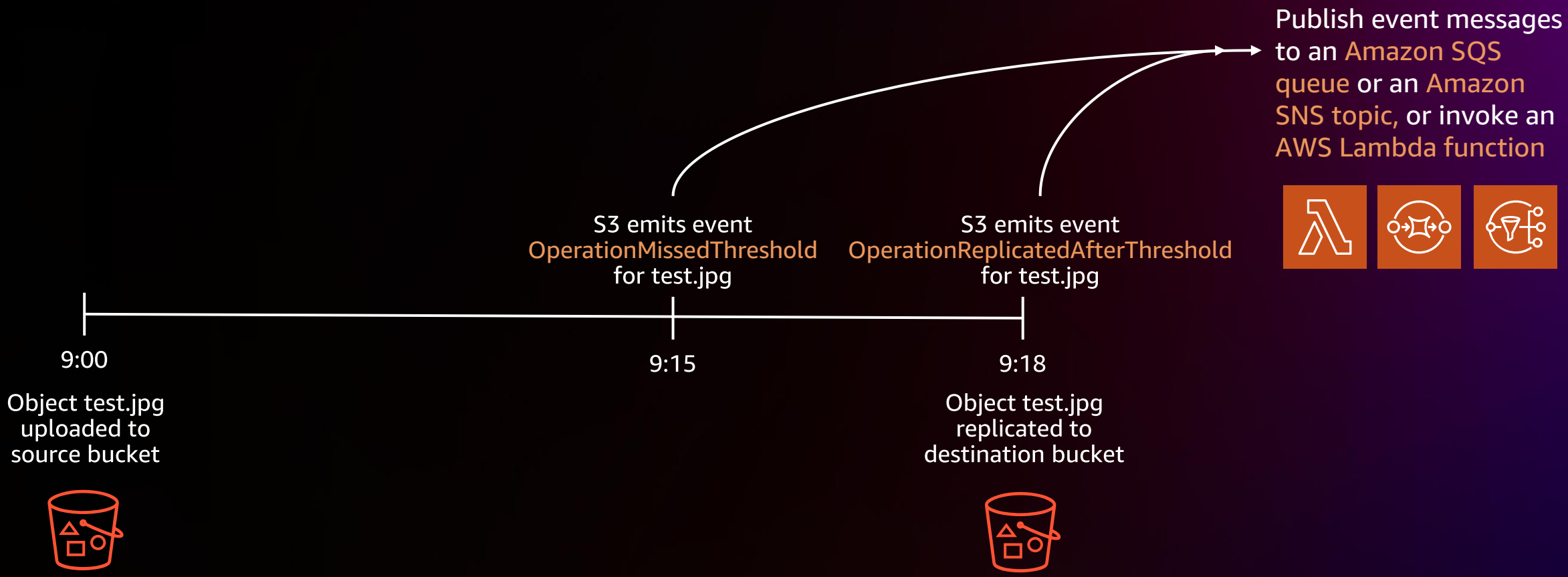
SLA backed replication

Commitment to replicate 99.9% of objects in 15 mins or less

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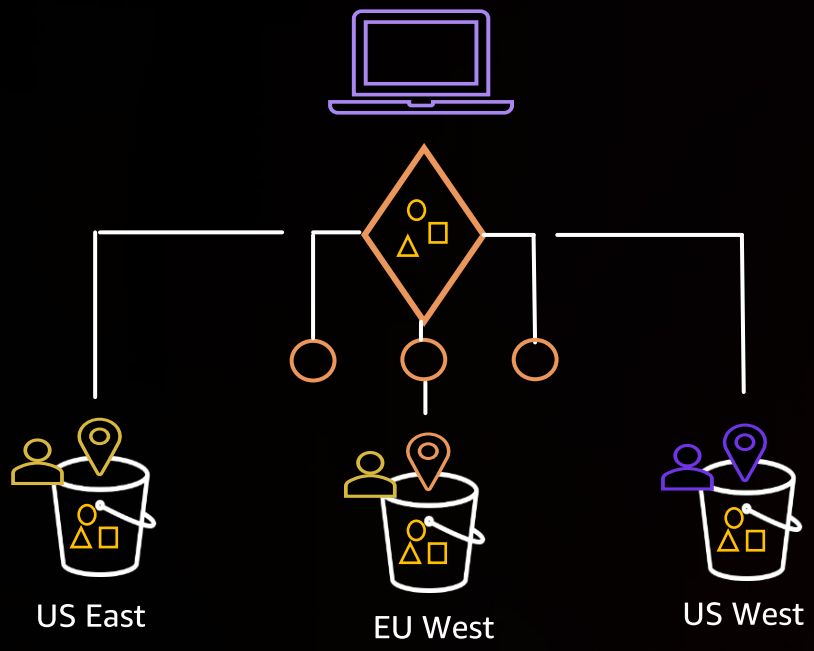
S3 RTC events to monitor SLA



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S3 Multi-Region Access Points

SINGLE GLOBAL END-POINT TO ACCESS A DATA SET THAT SPANS MULTIPLE S3 BUCKETS IN DIFFERENT AWS REGIONS



Simplified experience

Add multiple S3 buckets to a new global Multi-Region Access Point

Accelerated performance

Performance-based routing of requests across AWS Global network

Centrally configured

Applications can operate across AWS Regions without any code changes

Controlled failover

New!

Disaster recovery and application failover in an active-passive configuration

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Let’s start building

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My replication architecture

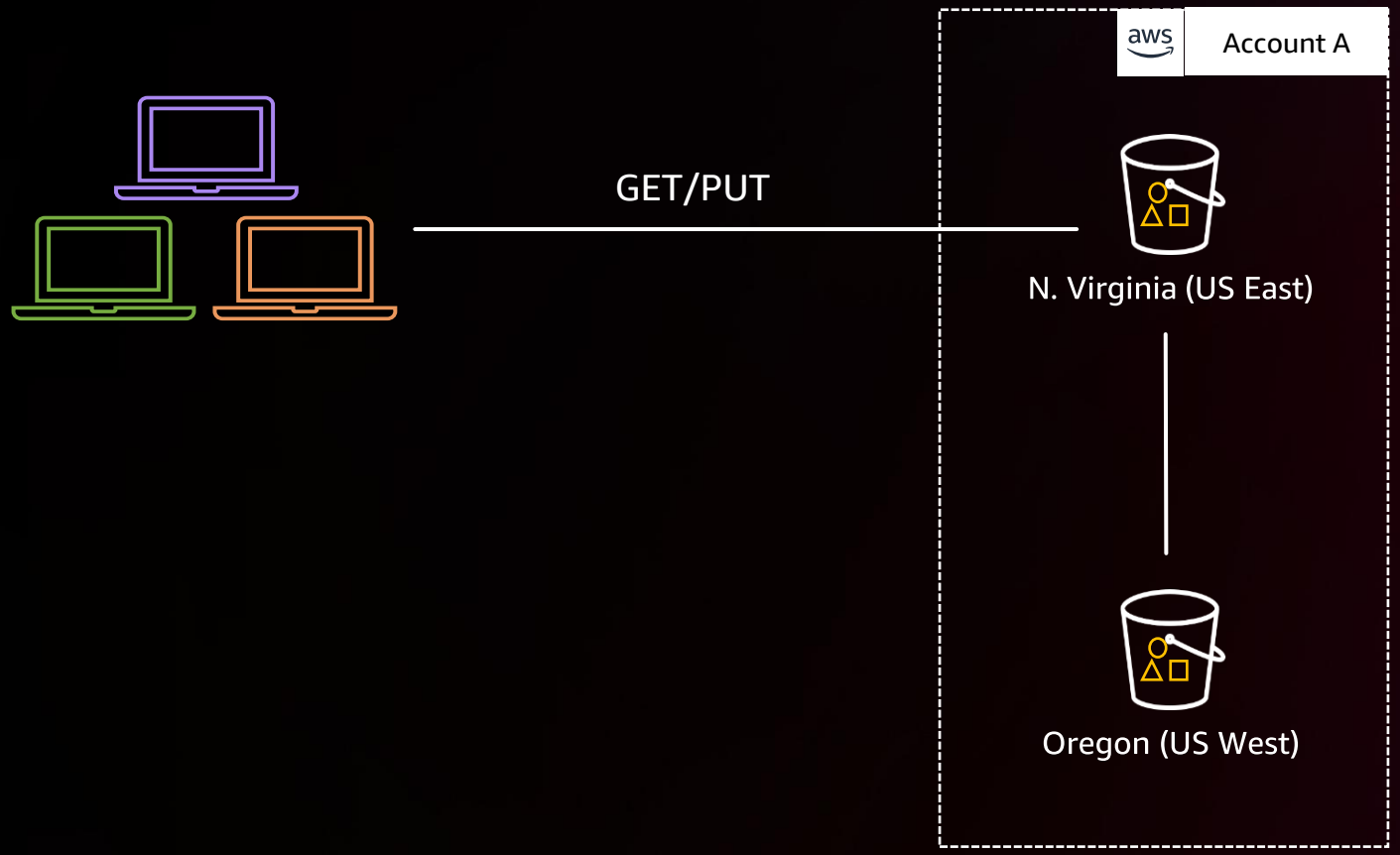
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My replication architecture

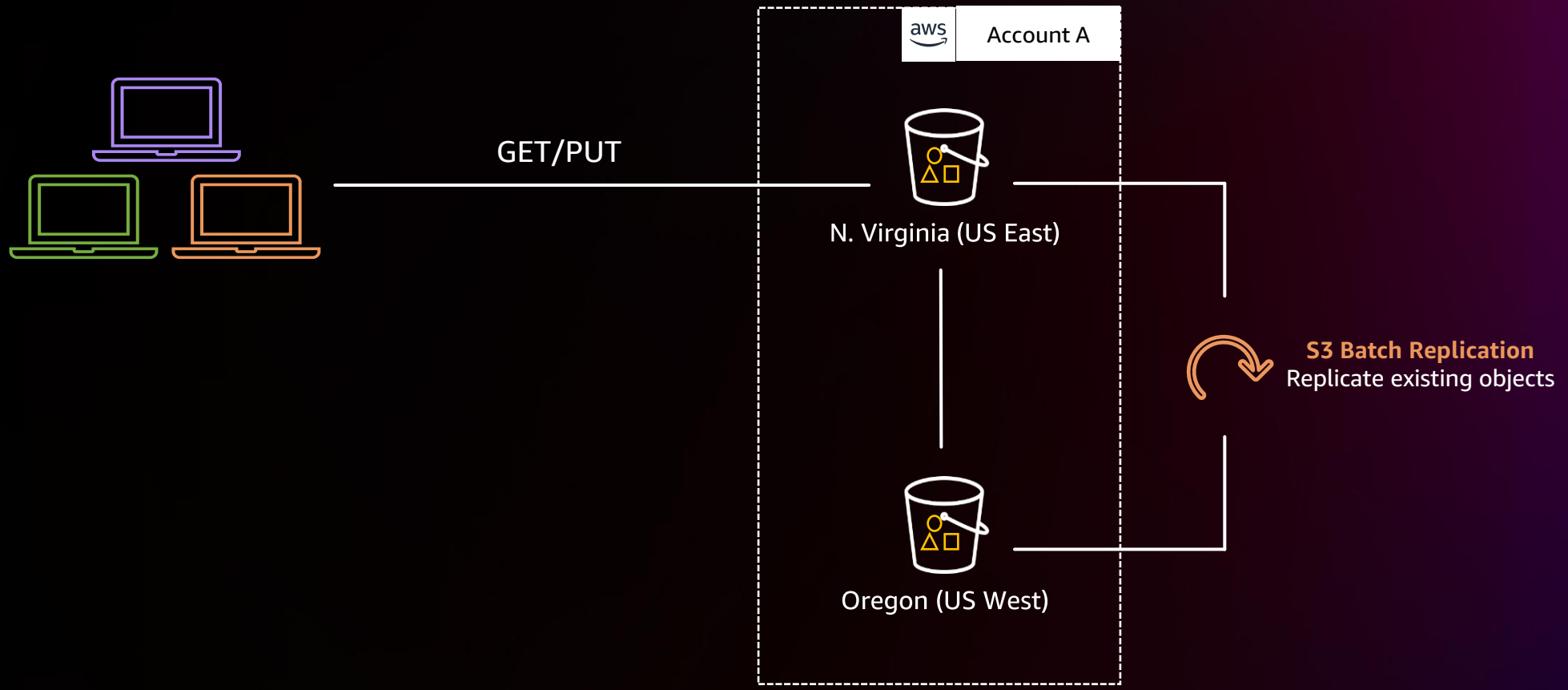
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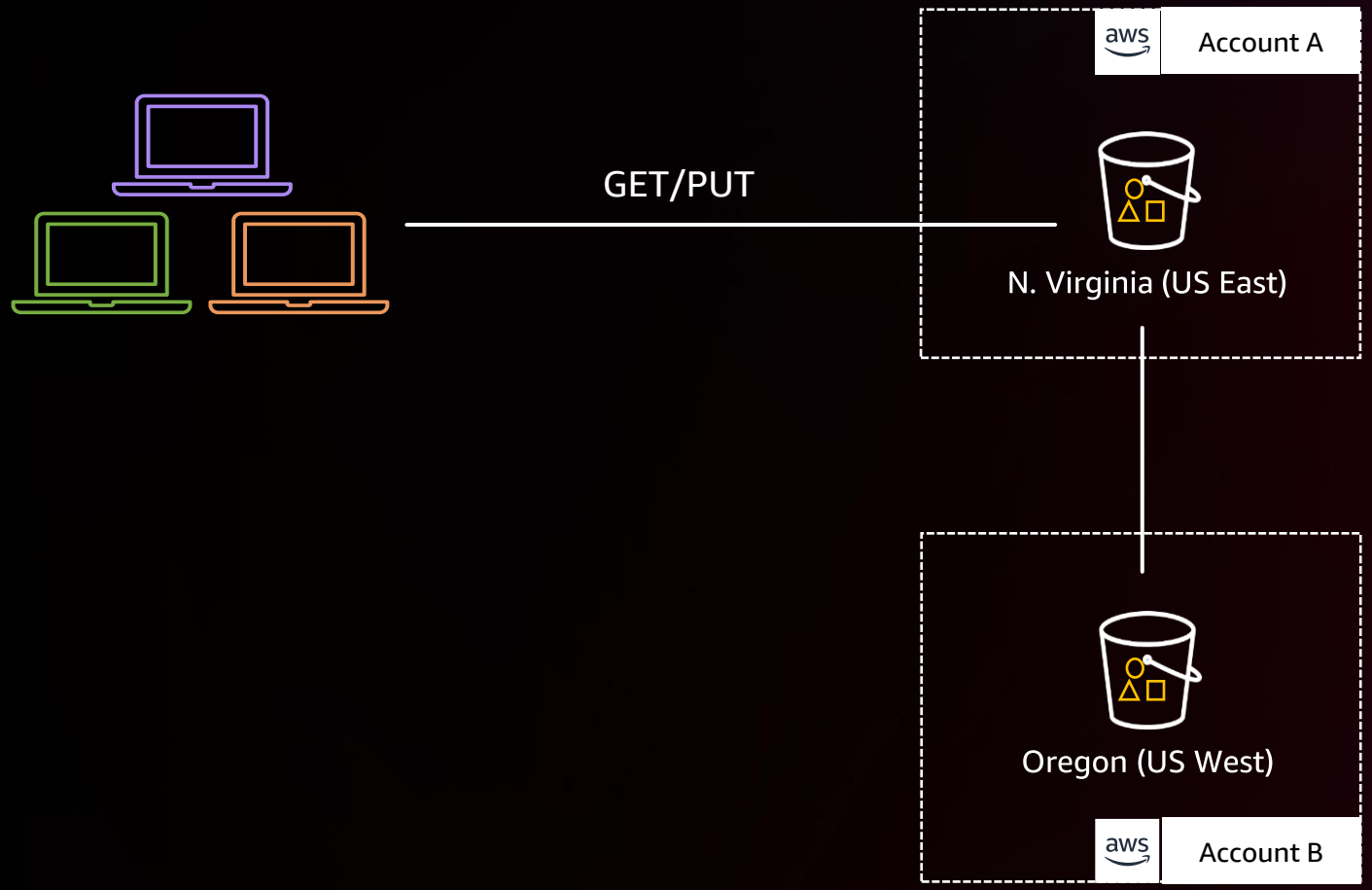
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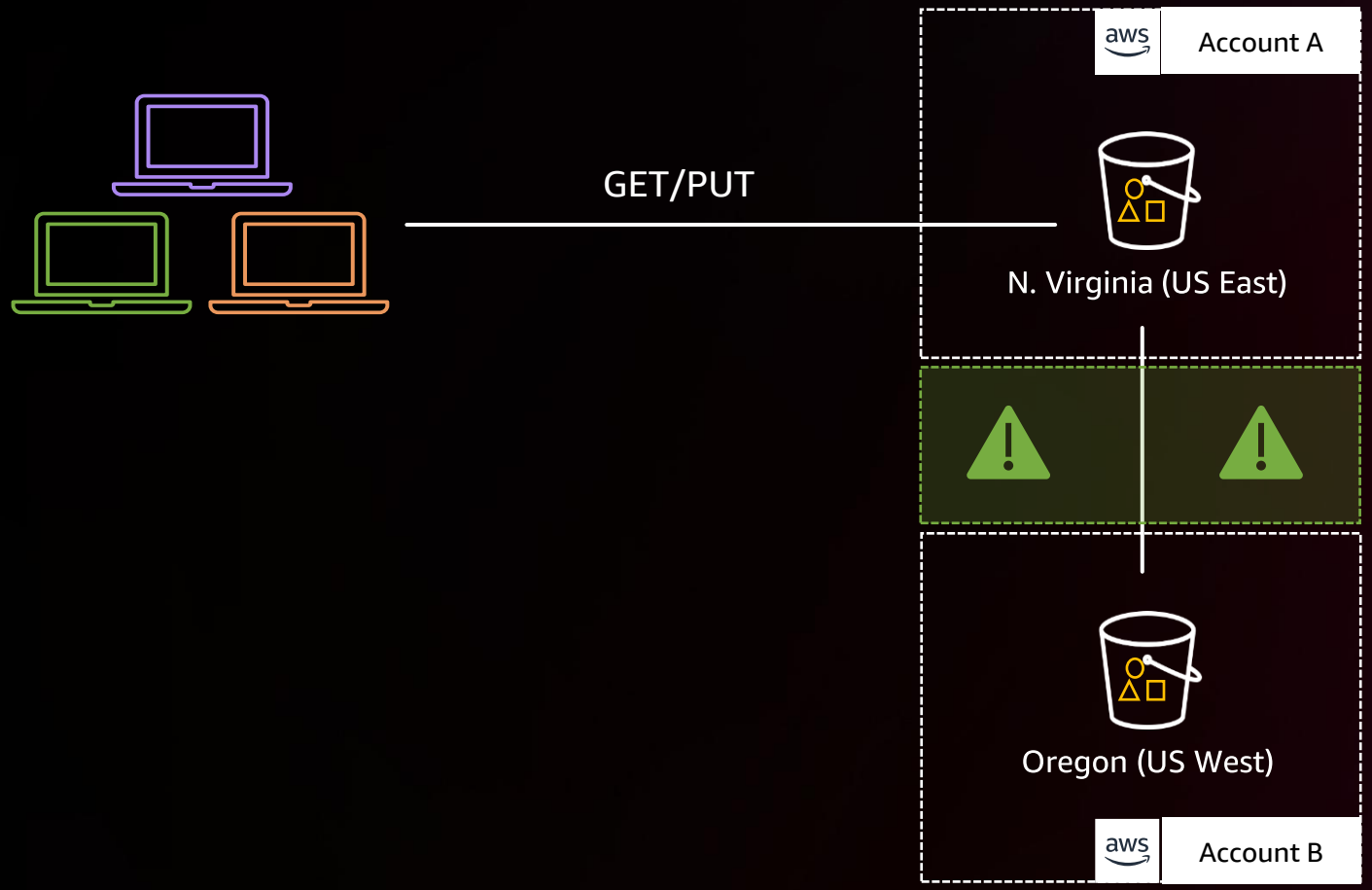
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Account Level Firewall
Isolate Your Replica

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My replication architecture

```
{
 "Sid":"Set permissions for objects",
 "Effect":"Allow",
 "Principal":{
  "AWS":"arn:aws:iam::source-bucket-acct-ID:role/service-role/source-acct-IAM-role”
 },
 "Action":["s3:ReplicateObject", "s3:ReplicateDelete"],
 "Resource":"arn:aws:s3:::DOC-EXAMPLE-BUCKET/*”
}
```

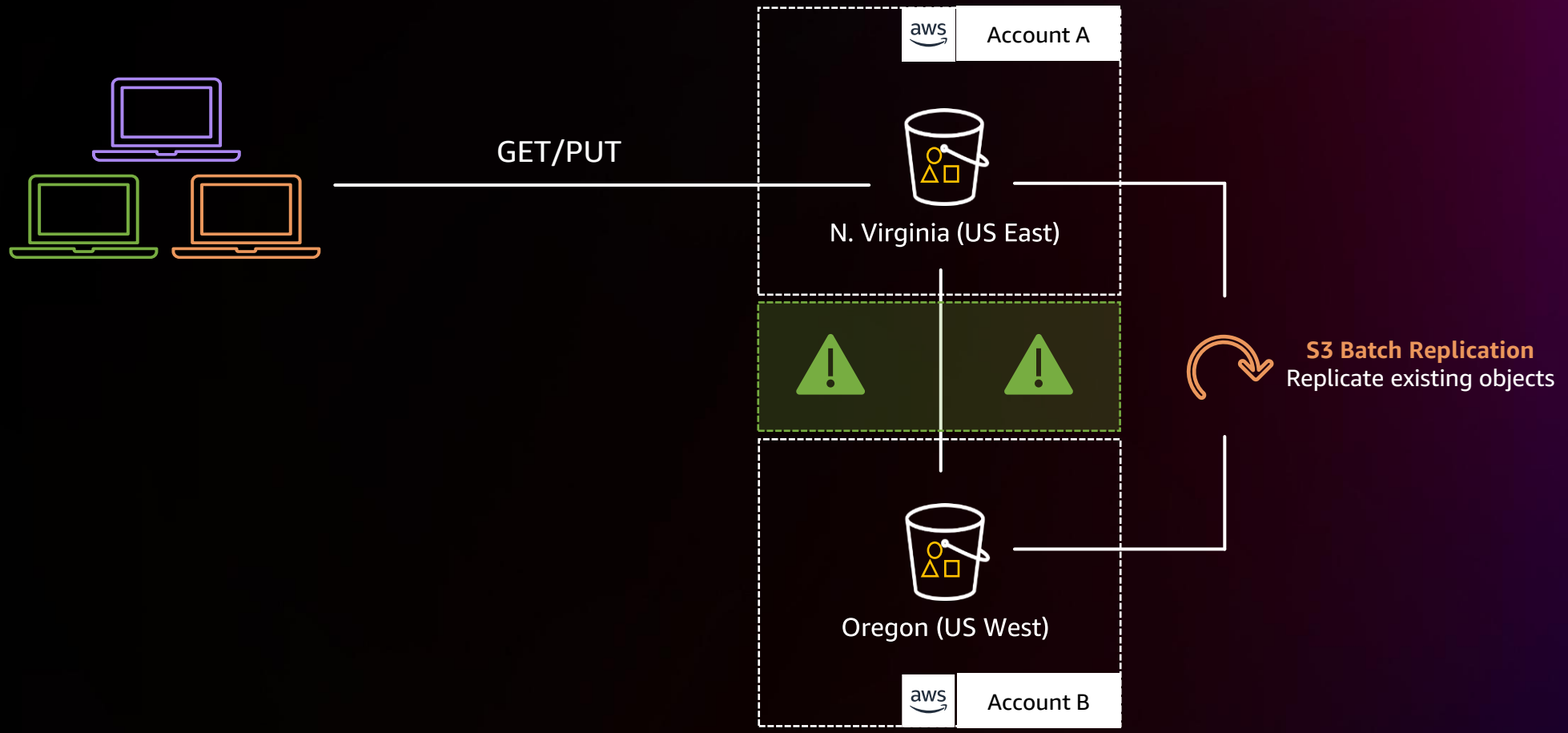
```
{
 "Sid":"Set permissions on bucket",
 "Effect":"Allow",
 "Principal":{
  "AWS":"arn:aws:iam::source-bucket-acct-ID:role/service-role/source-acct-IAM-role”
 },
 "Action":["s3:List*", "s3:GetBucketVersioning", "s3:PutBucketVersioning"],
 "Resource":"arn:aws:s3:::DOC-EXAMPLE-BUCKET"
}
```

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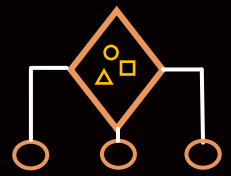
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S3 Multi-Region Access Point
Leverage Your Replica





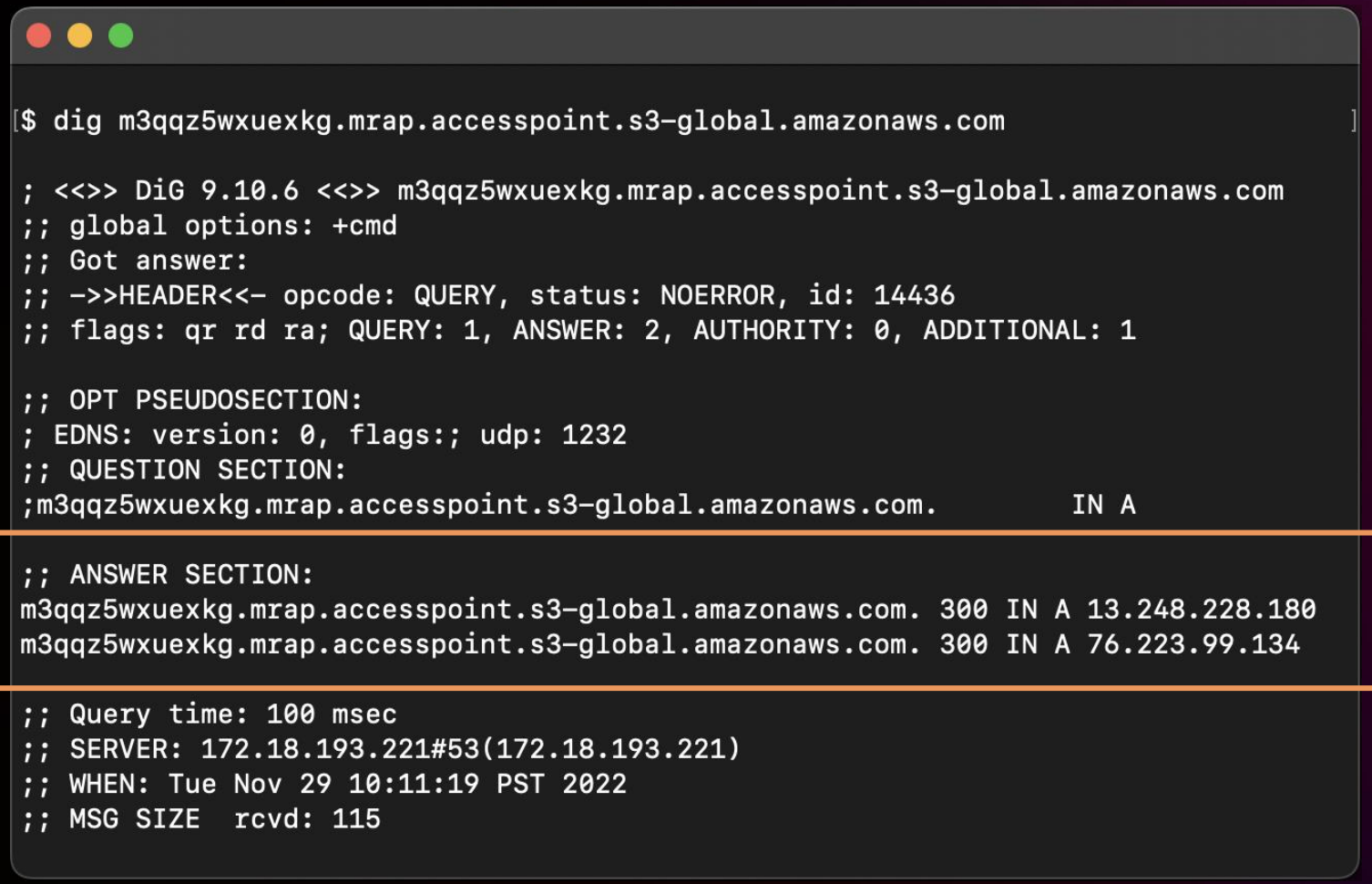
N. Virginia (US East)



Oregon (US West)

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My replication architecture



```
$ dig m3qqz5wxuexkg.mrap.accesspoint.s3-global.amazonaws.com

; <<>> DiG 9.10.6 <<>> m3qqz5wxuexkg.mrap.accesspoint.s3-global.amazonaws.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 14436
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 1

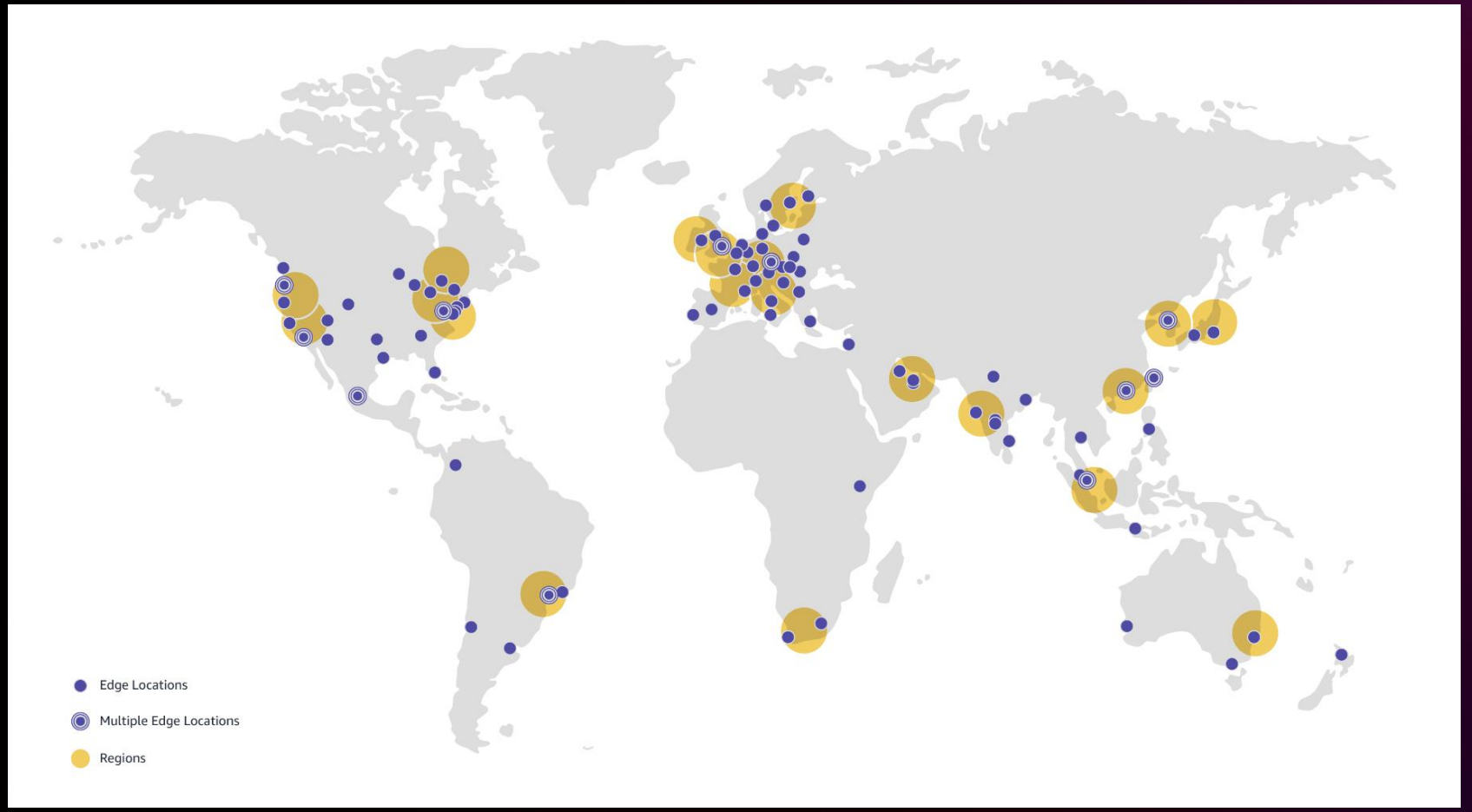
;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
;; QUESTION SECTION:
;m3qqz5wxuexkg.mrap.accesspoint.s3-global.amazonaws.com.        IN A

;; ANSWER SECTION:
m3qqz5wxuexkg.mrap.accesspoint.s3-global.amazonaws.com. 300 IN A 13.248.228.180
m3qqz5wxuexkg.mrap.accesspoint.s3-global.amazonaws.com. 300 IN A 76.223.99.134

;; Query time: 100 msec
;; SERVER: 172.18.193.221#53(172.18.193.221)
;; WHEN: Tue Nov 29 10:11:19 PST 2022
;; MSG SIZE  rcvd: 115
```

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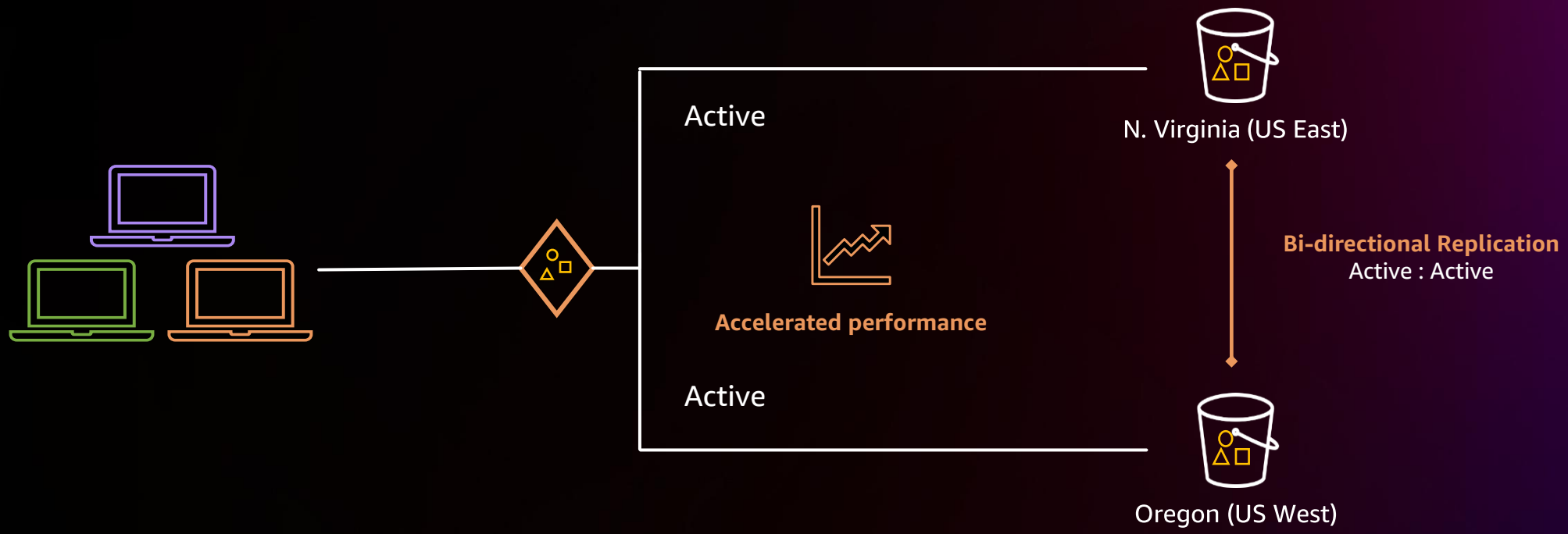


https://speedtest.globalaccelerator.aws/

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My replication architecture

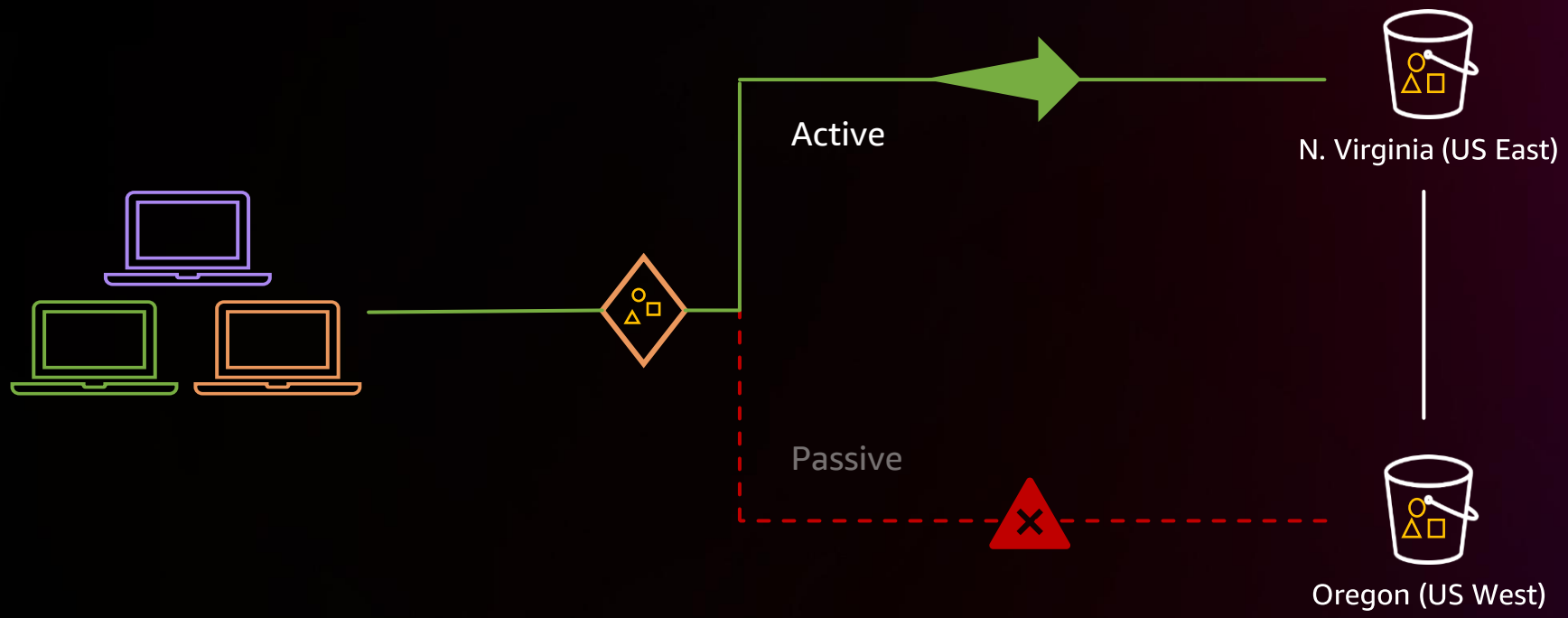
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My replication architecture

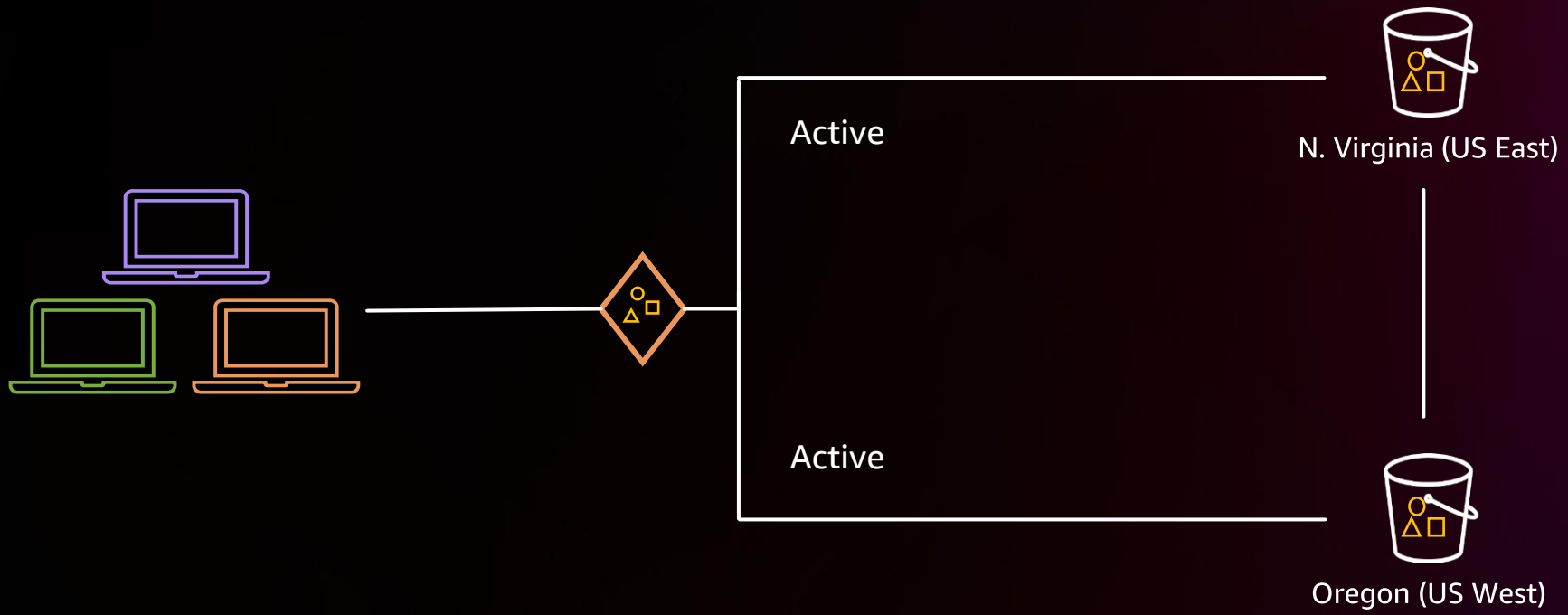
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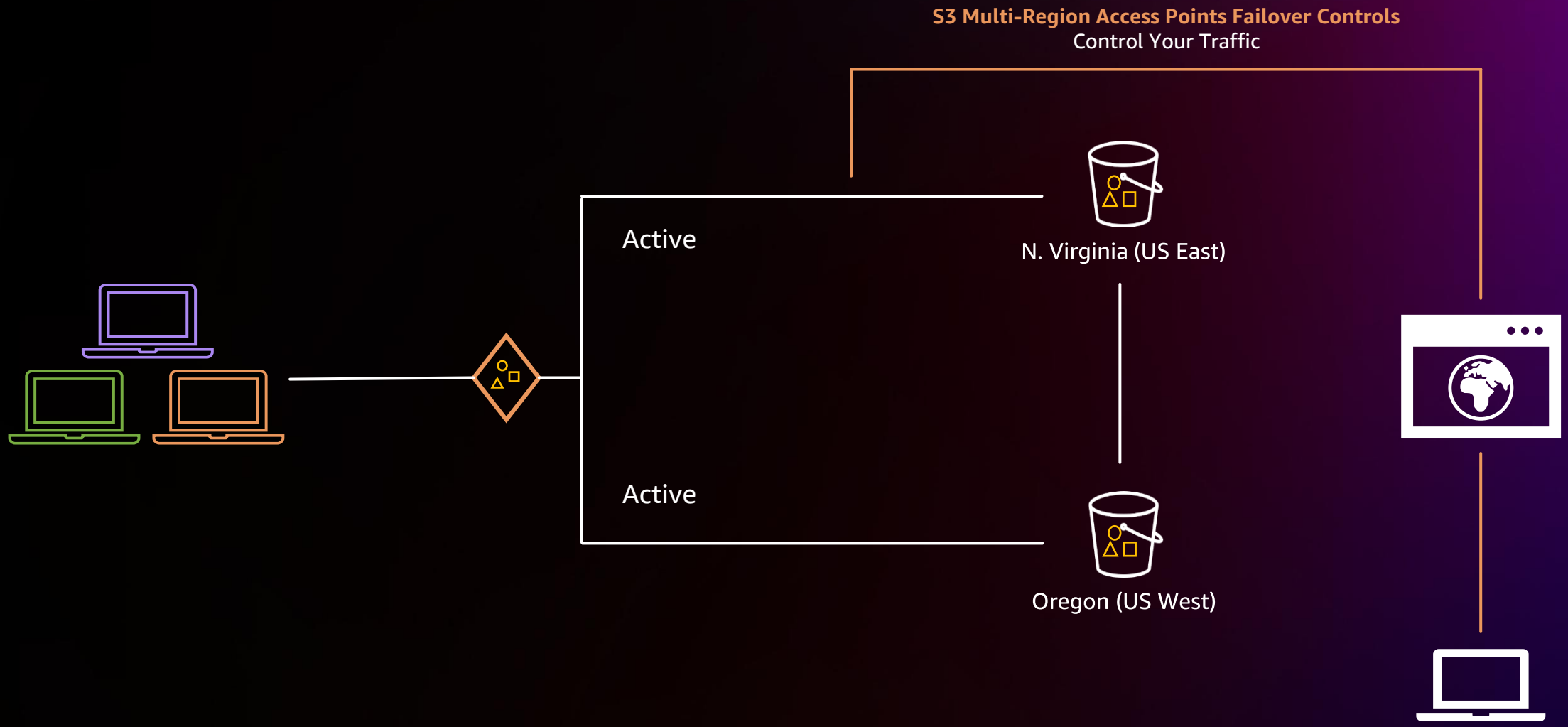


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New in 2022!

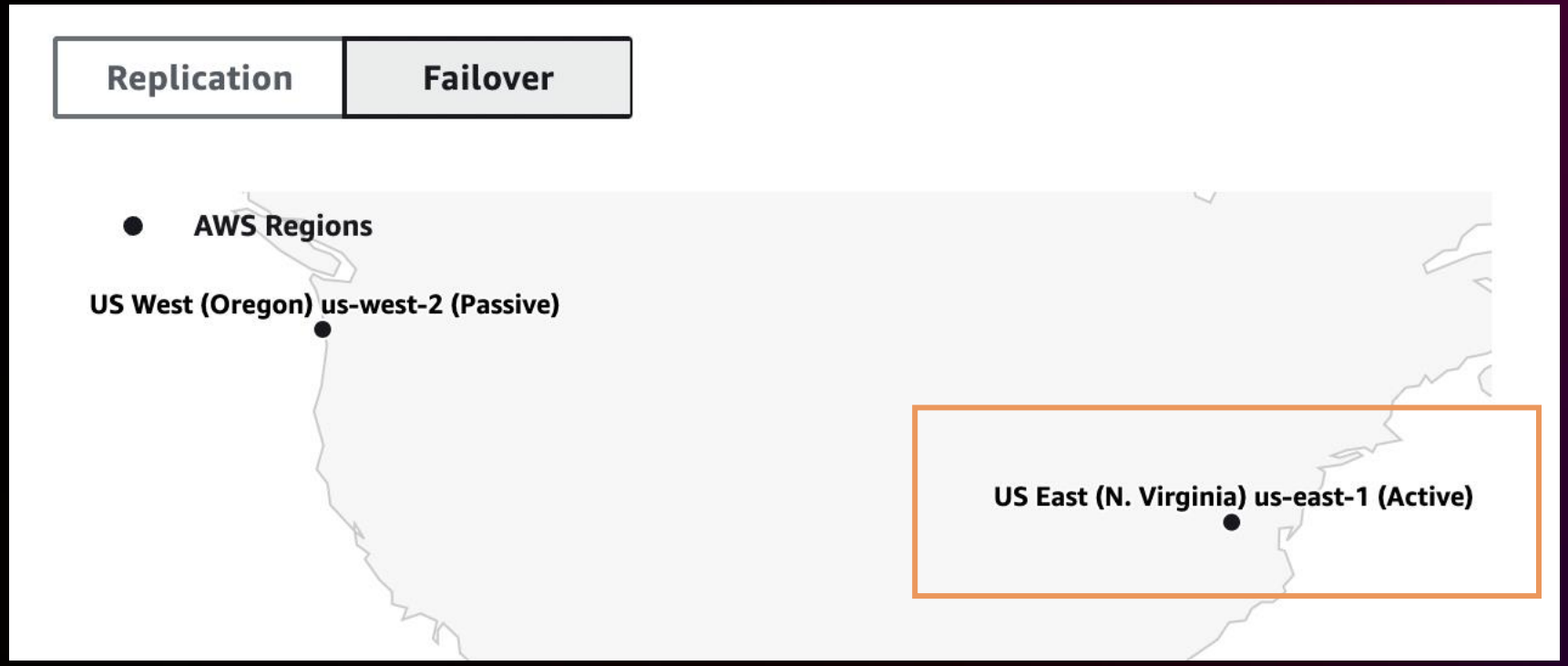


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New in 2022!

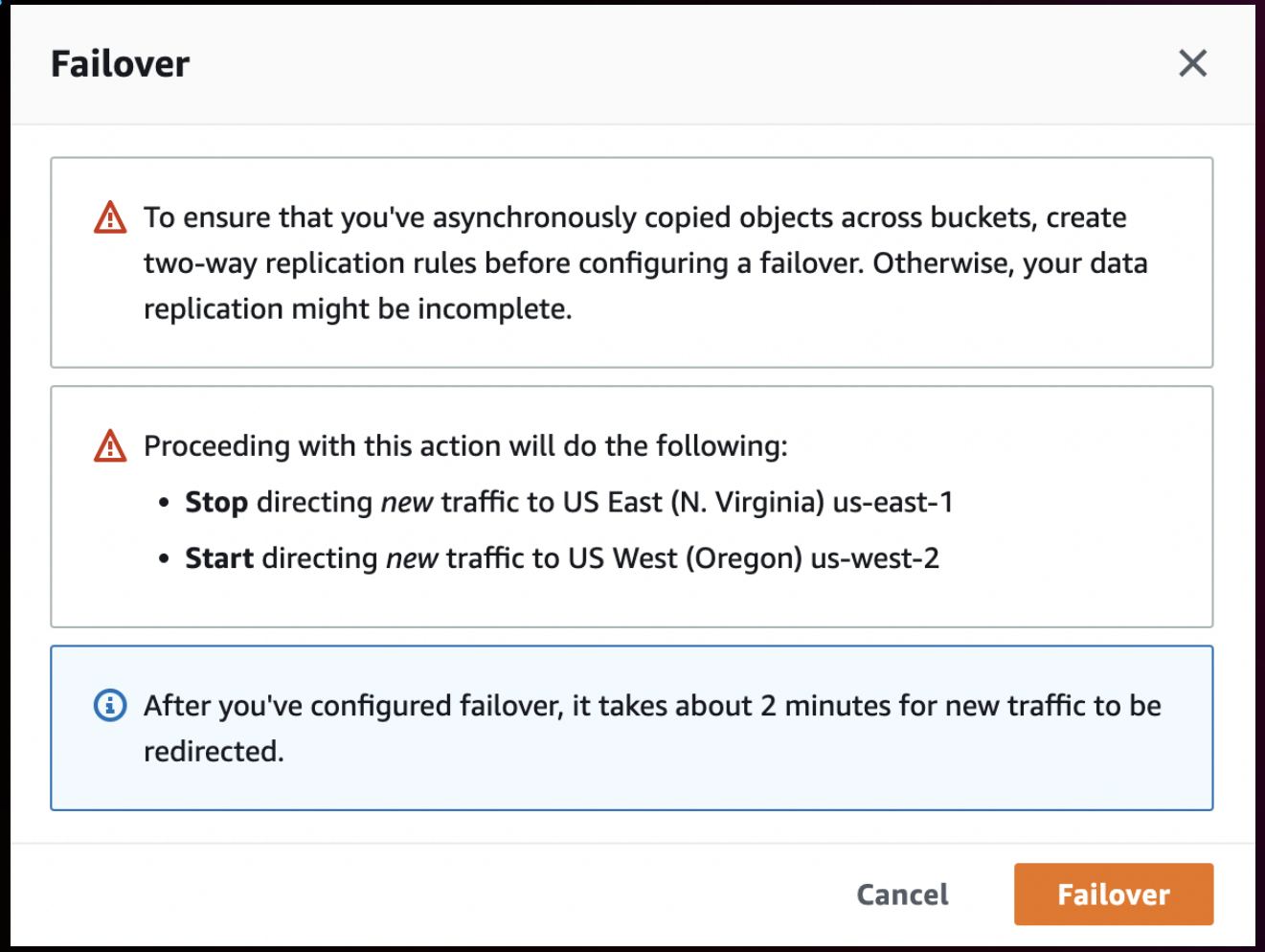


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New in 2022!



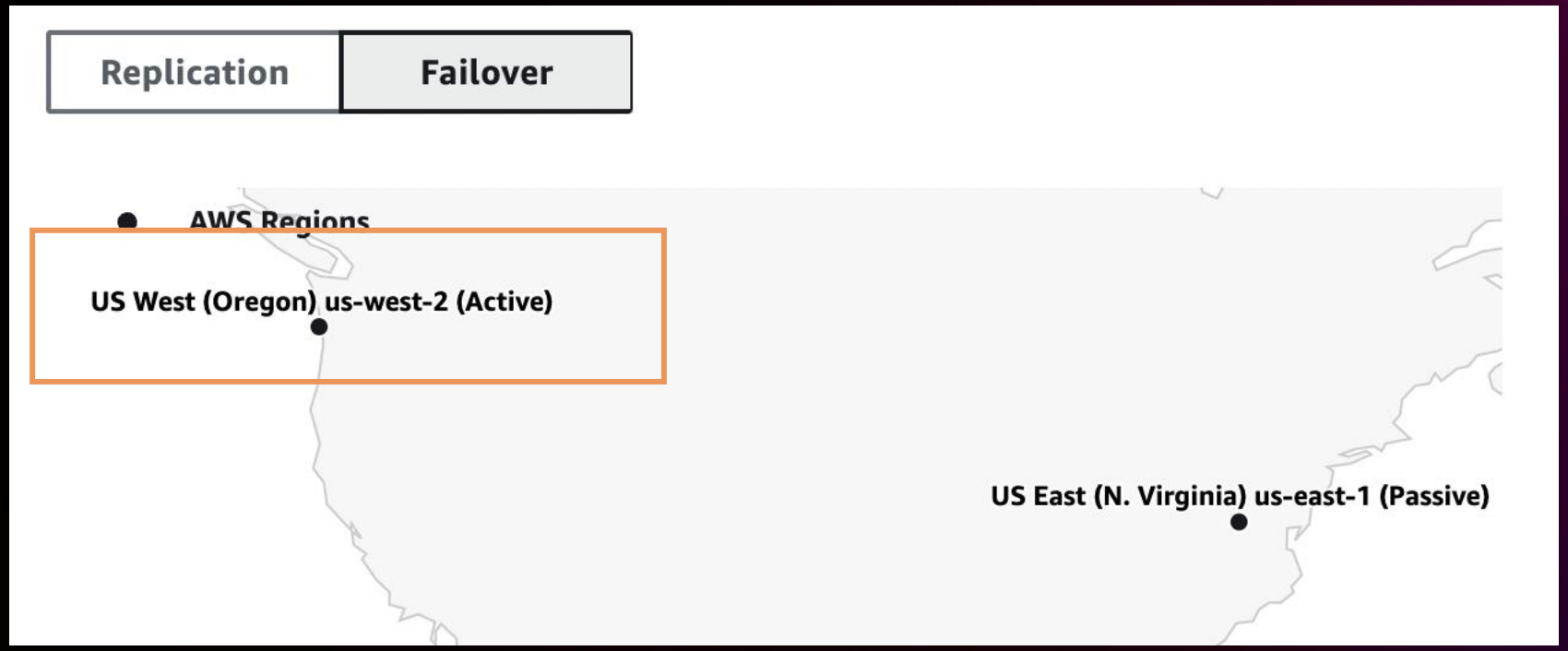
aws

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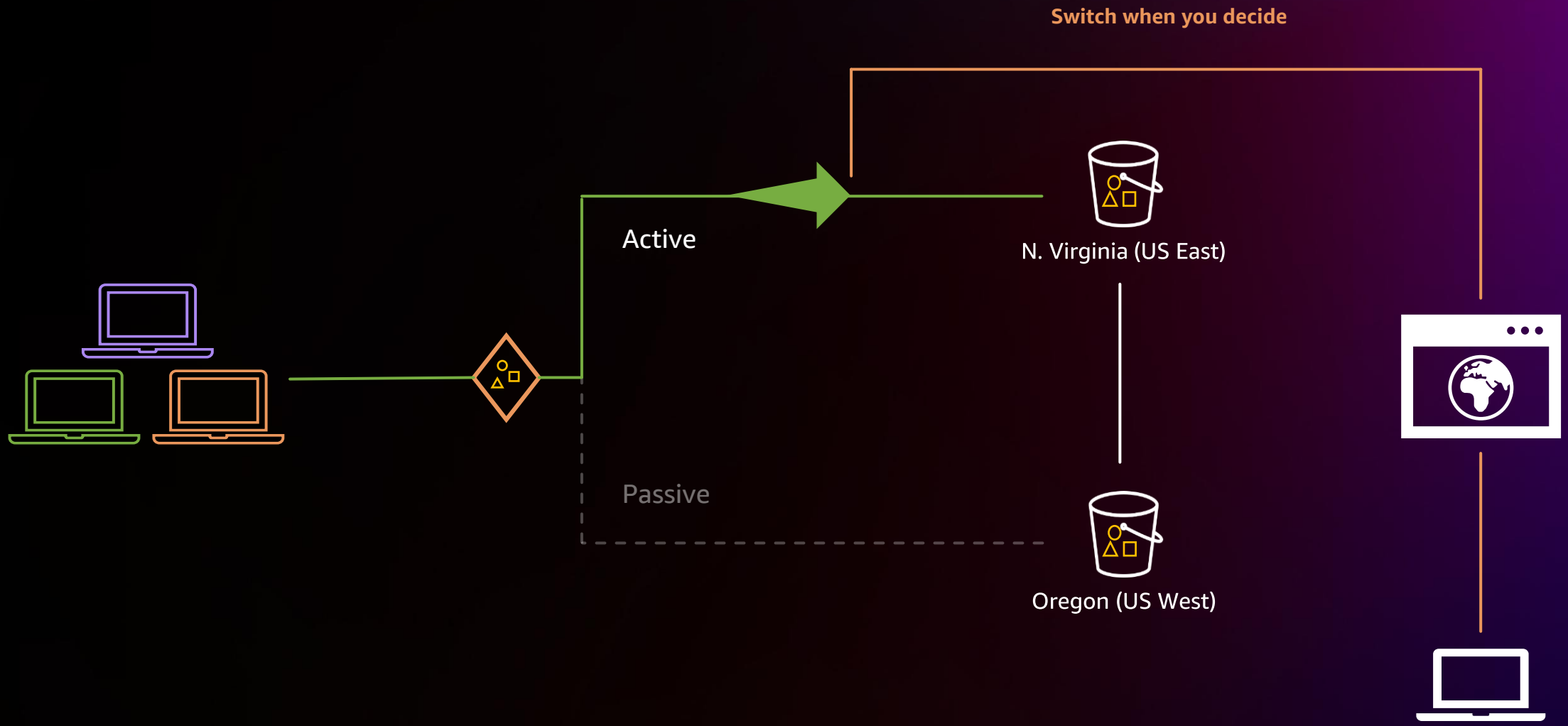
New in 2022!



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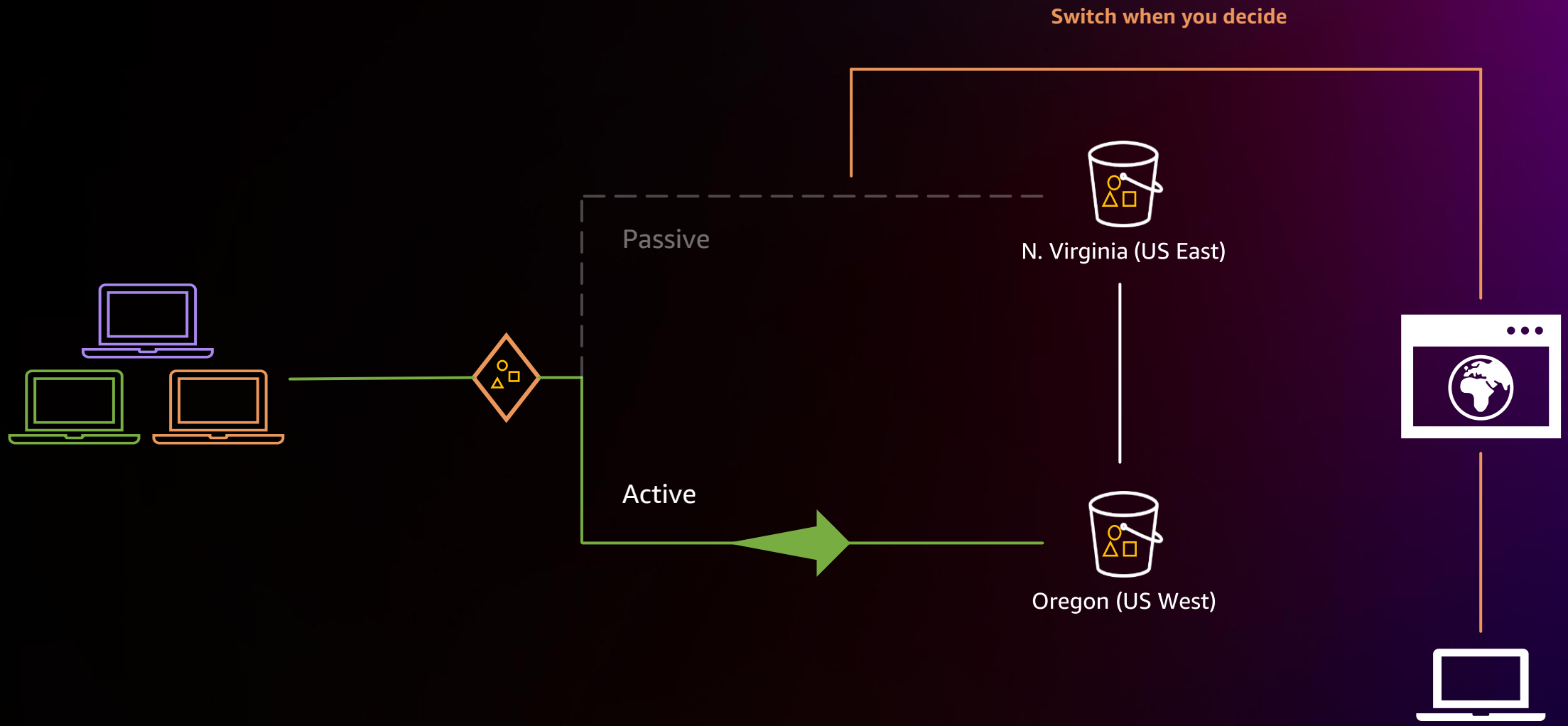
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My replication architecture

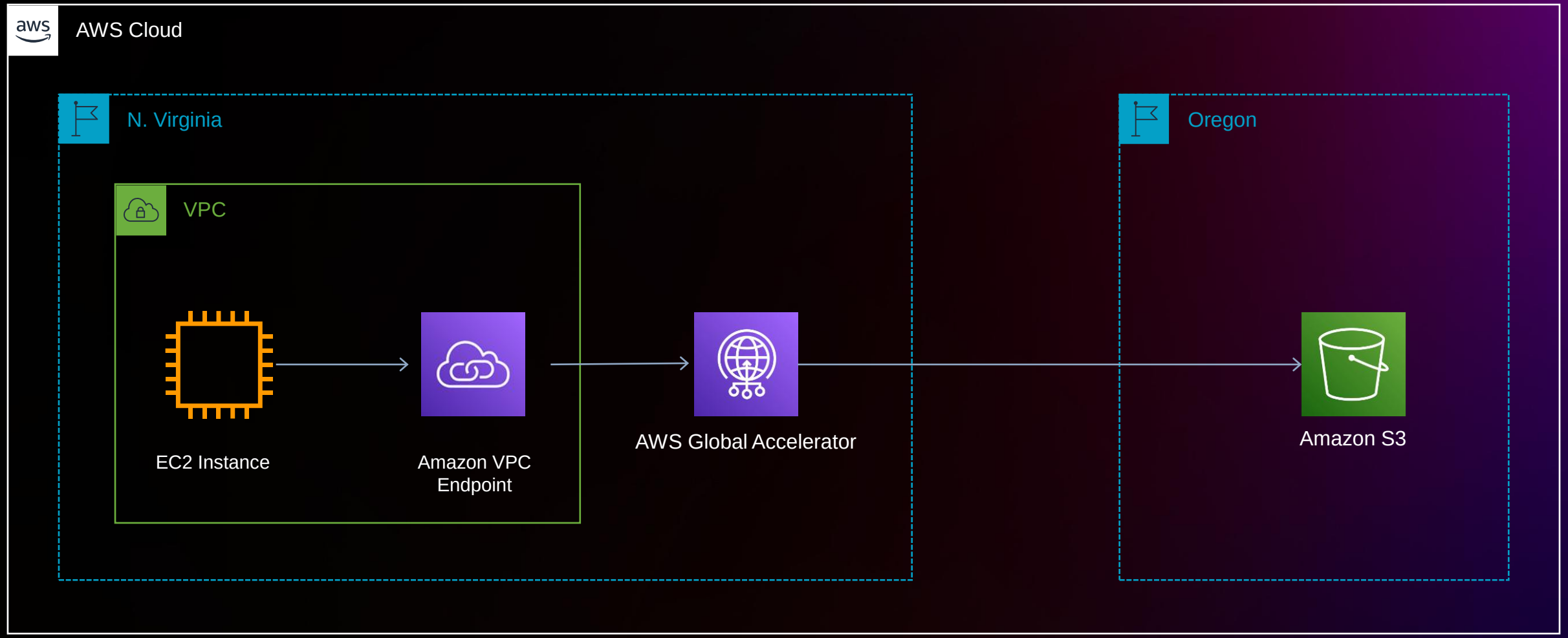
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My replication architecture

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Customer spotlight: Warner Bros. Discovery

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How WBD uses Amazon S3 Replication to secure HBO Max content for business continuity at scale

Abijit Gowda

Architect, Warner Bros. Discovery



WARNER BROS. DISCOVERY

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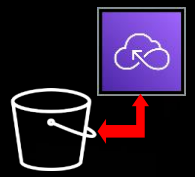
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- One of the leading premium streaming services
- 94.9 million subscribers (Q3 2022 – HBO/HBO Max & discovery+)
- 61 countries (Q3 2022)

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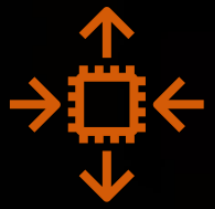
WBD media supply chain – at a glance



Decoupled compute and storage



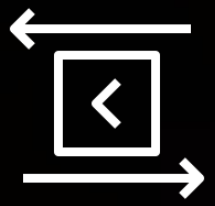
Terabytes of content transfer/day



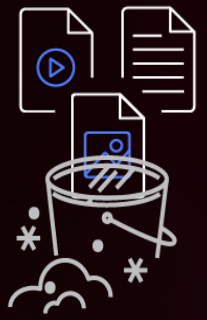
Hundreds of microservices



10s of PB of content on Amazon S3



Millions of S3 API requests/day



10s of PB of backup

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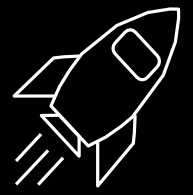
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Why back up content?



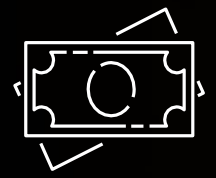
Content-centered business

Content is at the center of our business



Release impairment

Loss of content = inability to release or launch on time



Cost of content reproduction

Content reproduction is expensive both from a time and cost standpoint

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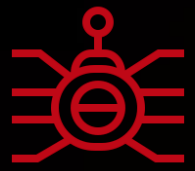
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Disaster scenarios coverage



Accidents

Human errors; bad deployments



Ransomware

Malicious data destruction; manipulations by bad actors; crypto viral extortions



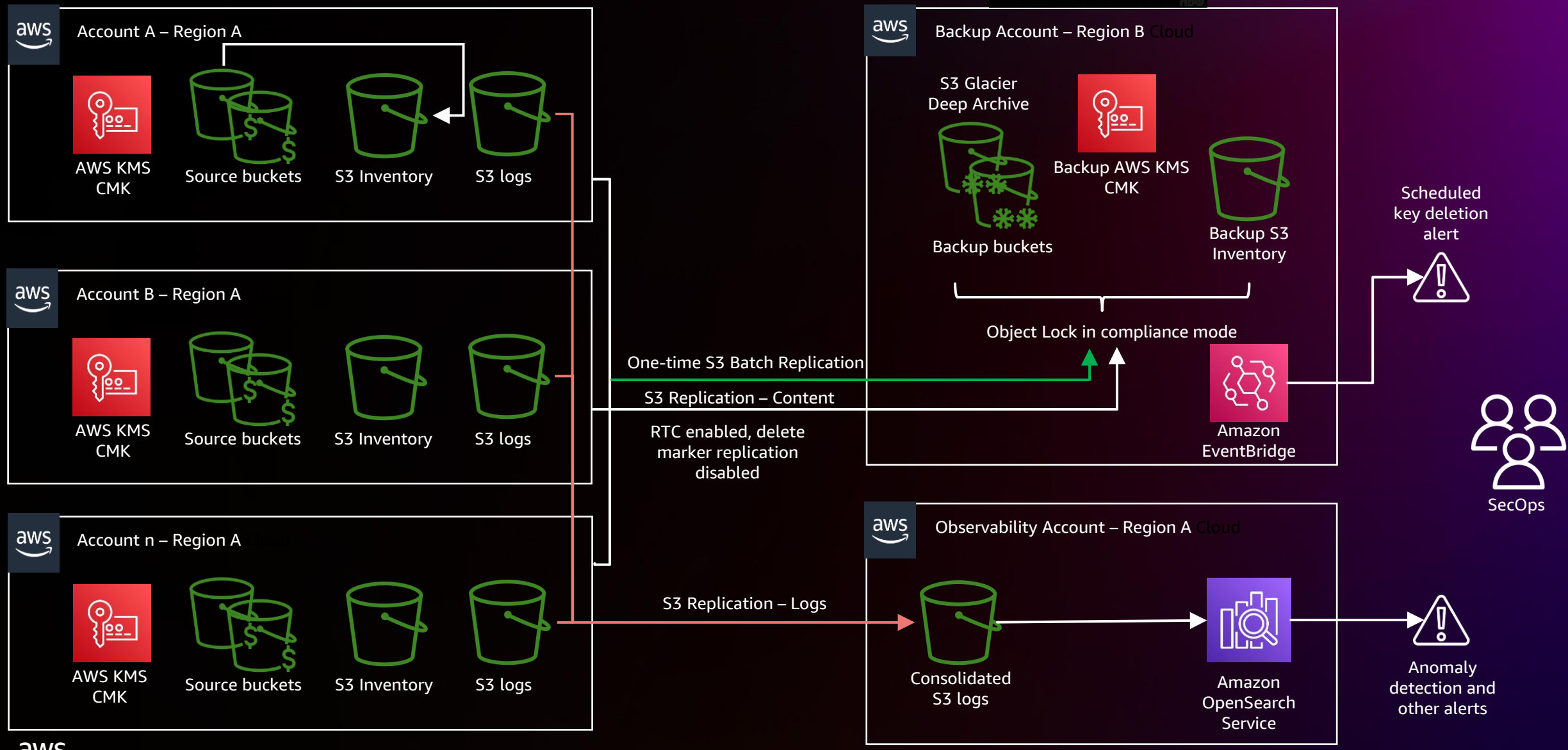
Regional outage

Impaired Regional services; natural calamities

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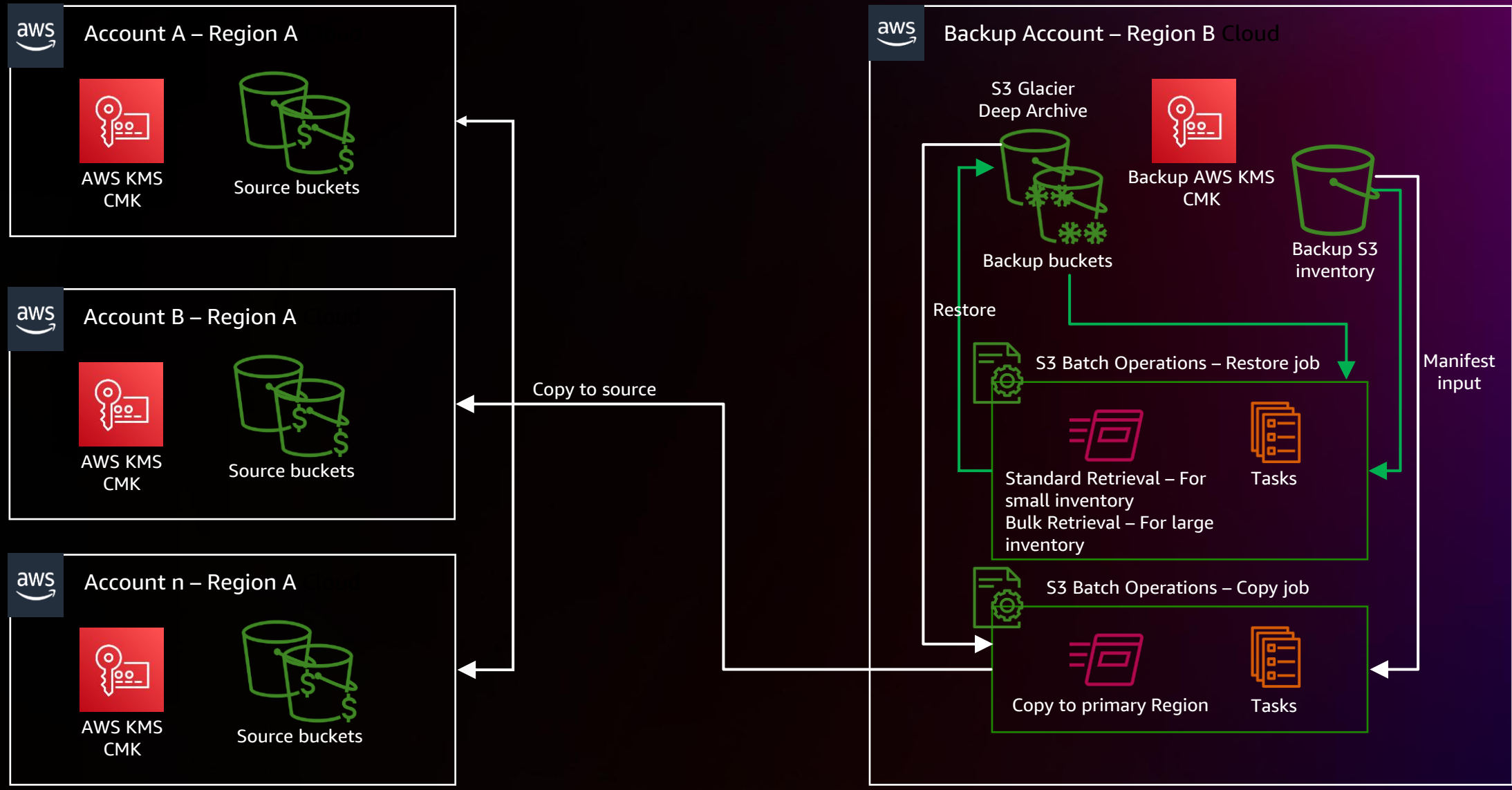
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How do the backups work?



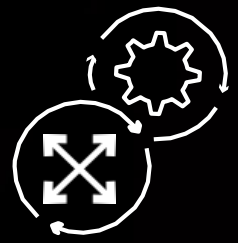
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How do the restores work?



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Benefits of S3 replication-based backups



Simple & automated



Cost optimized



Satisfies our compliance needs



Immutable



Cross-account & cross-Region



Meets RPO & RTO



Incremental & policy-driven



Fully observable

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Wrap-up

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Key takeaways

- Use Amazon S3 Replication to satisfy compliance, improve resiliency, optimize performance, and maintain data under different ownerships
- Enable S3 Replication Time Control for SLA-backed replication for compliance
- Replicate existing objects with S3 Batch Replication
- Combine S3 Replication with Amazon S3 Multi-Region Access Points to simplify building multi-Region application

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Tutorial:

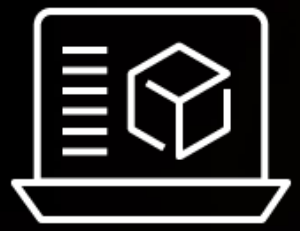
Getting started
with Amazon S3 Replication



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Continue your AWS Storage learning

Build a learning plan



Set your AWS Storage Learning Plans via **AWS Skill Builder**

Increase your knowledge



Use our **Ramp-Up Guides** to build your storage knowledge

Earn AWS Storage badges



Demonstrate your knowledge by achieving **digital badges**

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Thank you!

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