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

STG206

Data resiliency design patterns with AWS

Jay Rolette (he/him)

Senior Principal Engineer
AWS

Rajesh Vijayaraghavan (he/him)

Principal Business Development Manager
AWS

Expectations for today's talk

Enterprises want simple, fully managed services that protect their application data and increase the overall resiliency of their application stack. Builders want resilient application data services that are easy to use and scale. Both want application data resiliency and protection to ensure business continuity and disaster recovery (DR) for their customers.

We are going to offer you guidance that will help you understand data resiliency and how to incorporate it into your architecture on AWS, wherever you are in your cloud journey

We will cover application data resiliency and protection design patterns, extending from the native data resiliency capabilities of AWS Storage through DR solutions using AWS Elastic Disaster Recovery

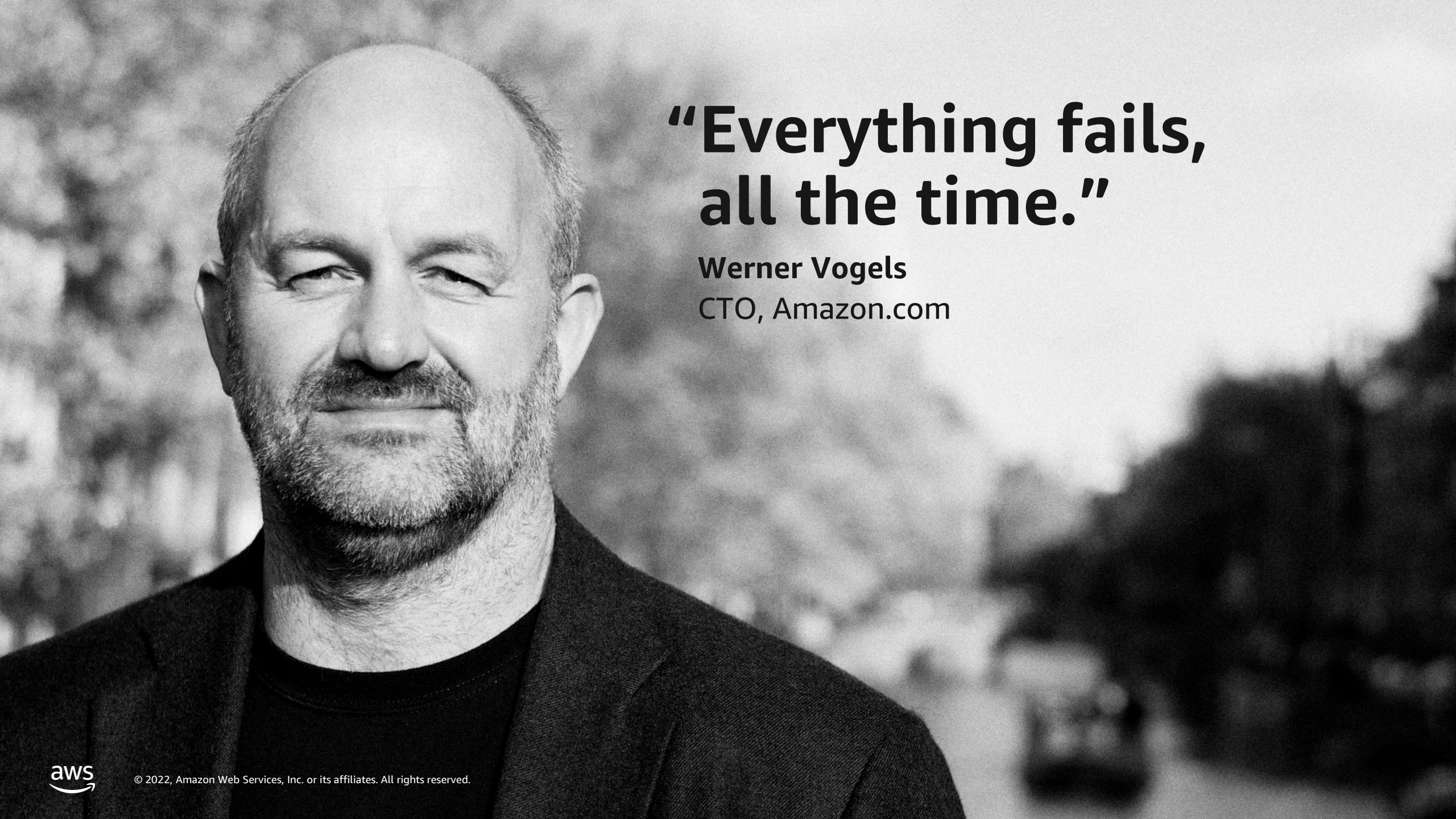
What is data resiliency?

Ability of your workload to withstand partial and intermittent failures across components, and eventually recover from unexpected conditions

High Availability

Resistance to common failures through design and operational mechanisms

Core services, design goals to meet the availability 9s



What is data resiliency?

Ability of your workload to withstand partial and intermittent failures across components, and eventually recover from unexpected conditions

High Availability

Resistance to common failures through design and operational mechanisms

Core services, design goals to meet the availability 9s

Disaster Recovery

Returning to operations within specific targets for rare but high impactful failures

Backup & Recovery, Data bunkering, Managed RPO/RTO

Business impact of resilience is bigger than ever

$1.25B to $2.5B

Annual Fortune 1,000 application downtime costs (IDC)

$474K

Average cost/hour of downtime (Ponemon Institute)

$500K to $1M

Cost/hour of a critical application failure (IDC)

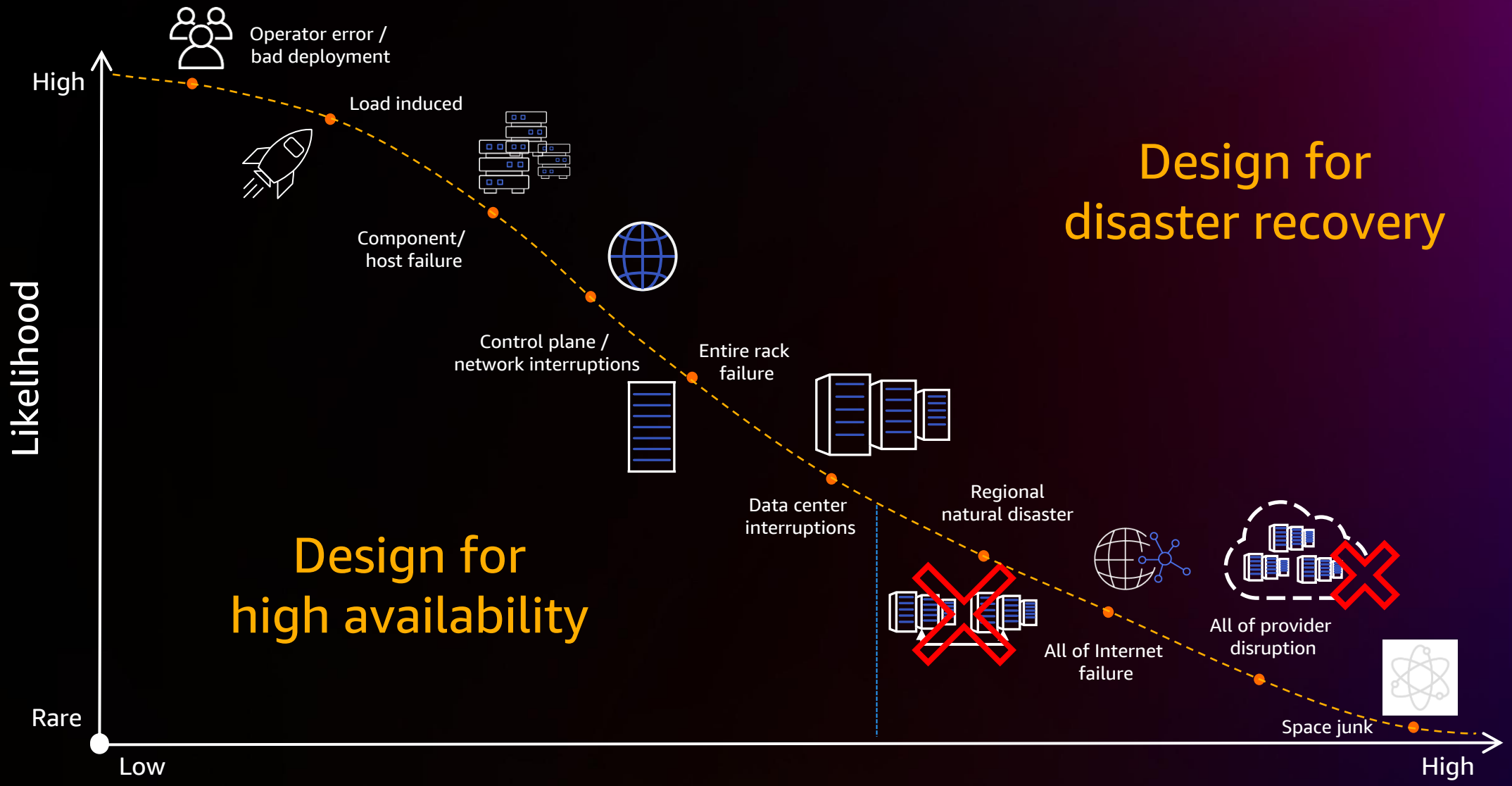
$100K

Average cost/hour of an infrastructure failure (IDC)

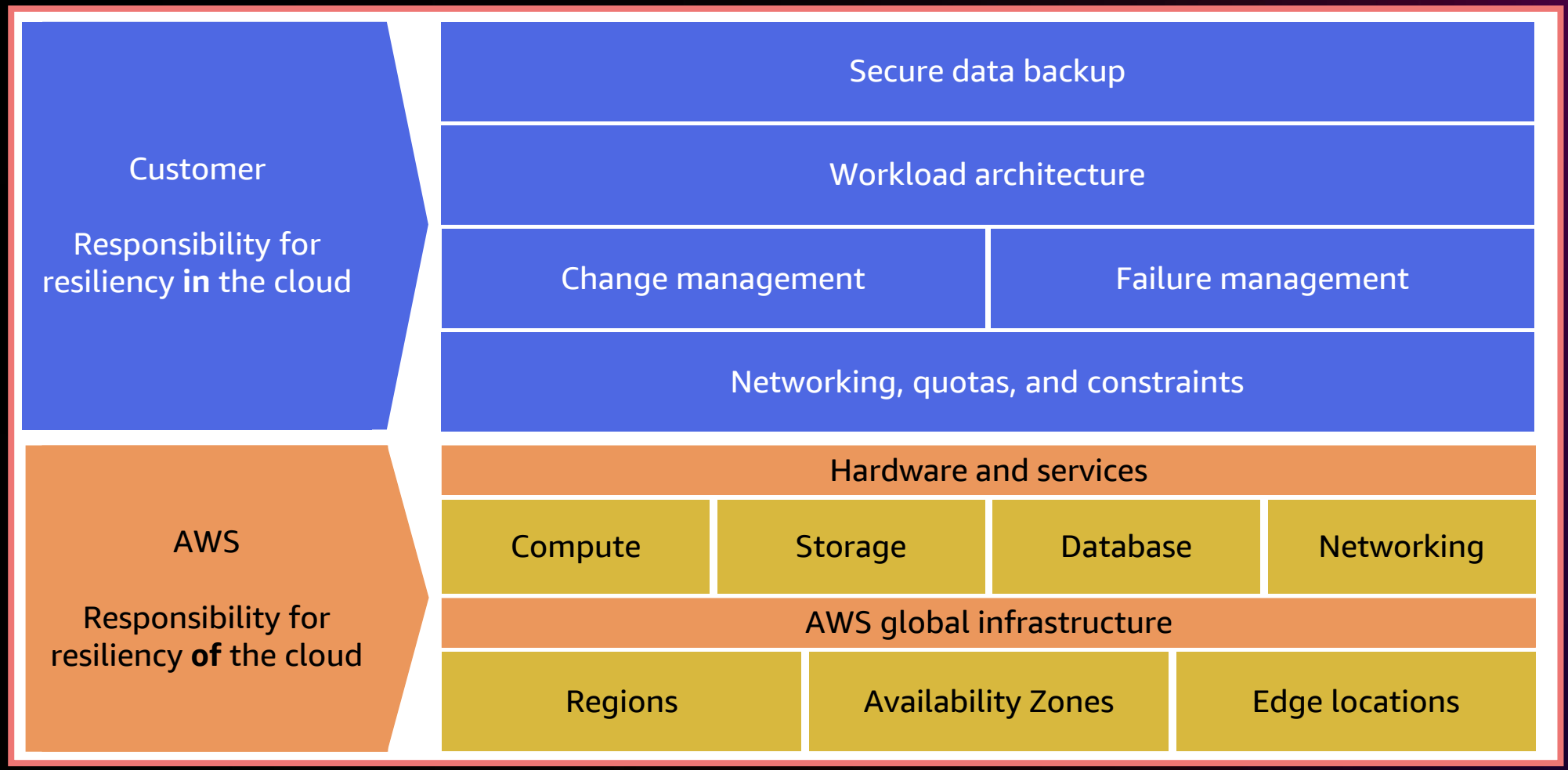
Cost savings of 15%–25%

Aggregated cost savings from investing in key digital resilience levers (BCG)

Impact vs. likelihood of failure



Shared responsibility model for resilience

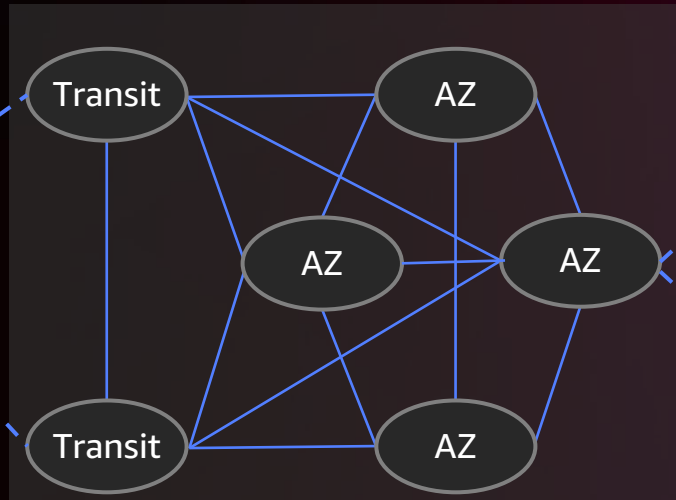


AWS Regions and Availability Zones

INFRASTRUCTURE FOUNDATION FOR DATA RESILIENCE

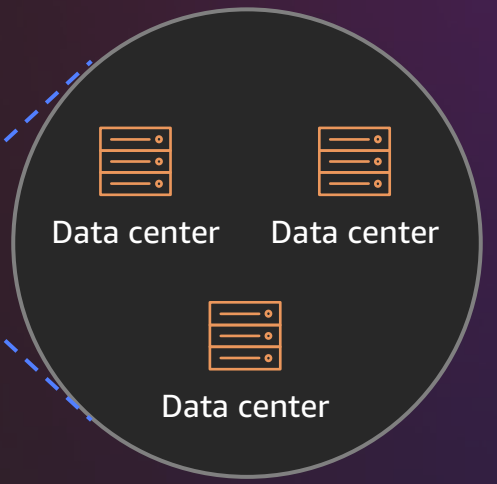
30 AWS Regions worldwide

Each AWS Region has multiple AZs



A **Region** is a physical location in the world

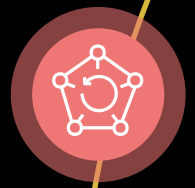
Each AZ is one or more discrete data centers



Data centers, each with redundant power, networking, and connectivity, housed in separate facilities

Data protection & resiliency

AWS storage portfolio



AWS Backup

AWS Elastic
Disaster Recovery

AWS Resilience Hub

BLOCK

Amazon
EBS

OBJECT

Amazon S3 and
Amazon S3 Glacier

FILE

Amazon FSx

Amazon
EFS

AWS Transfer
Family

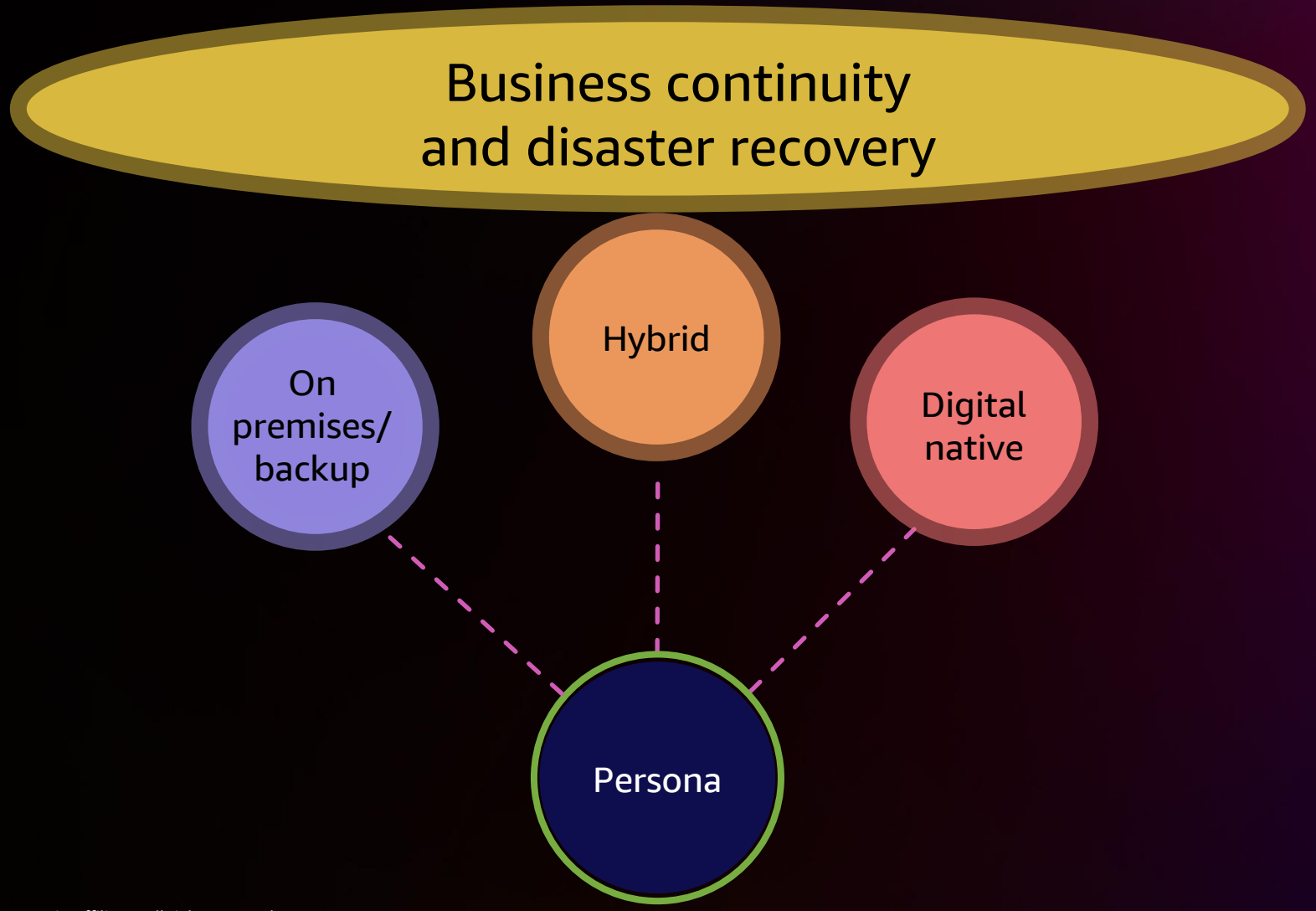
AWS Snow
Family

AWS Storage
Gateway

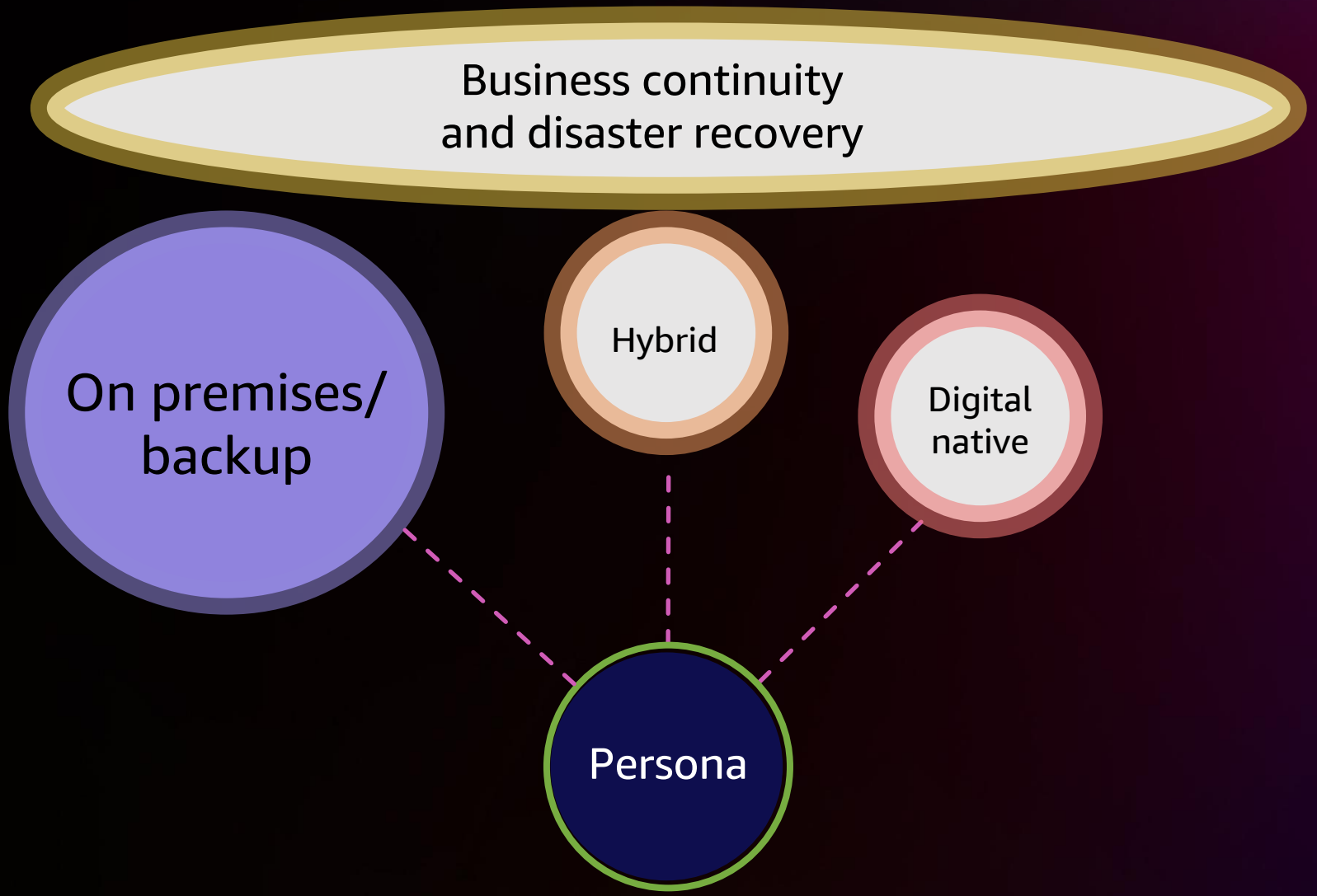
AWS DataSync

AWS customer persona and cloud journey

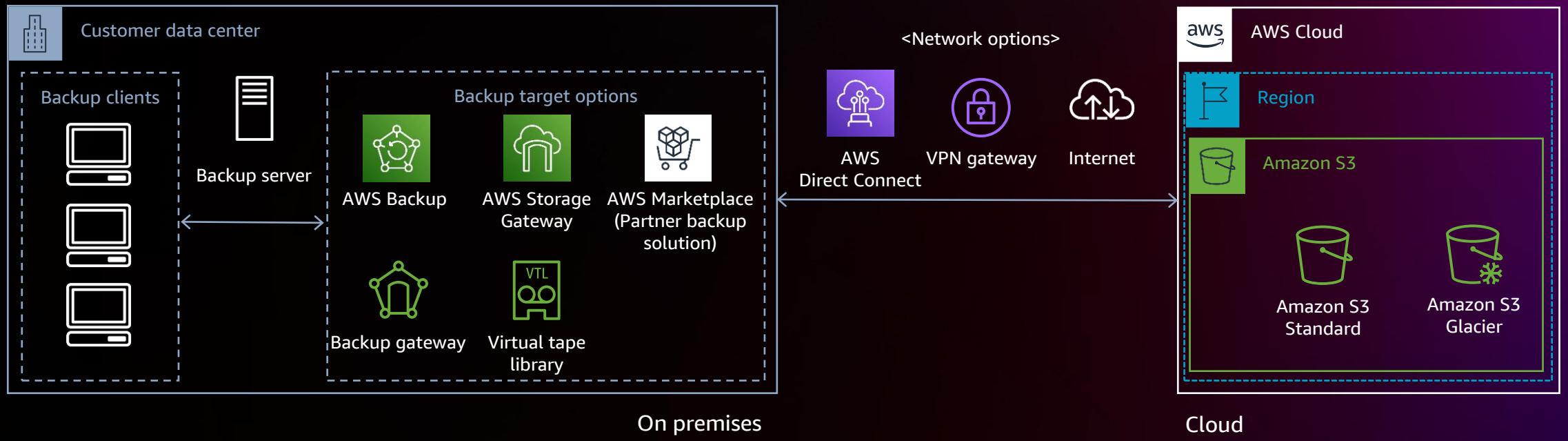
DIFFERENT PHASES OF THE TYPICAL AWS CUSTOMER CLOUD JOURNEY



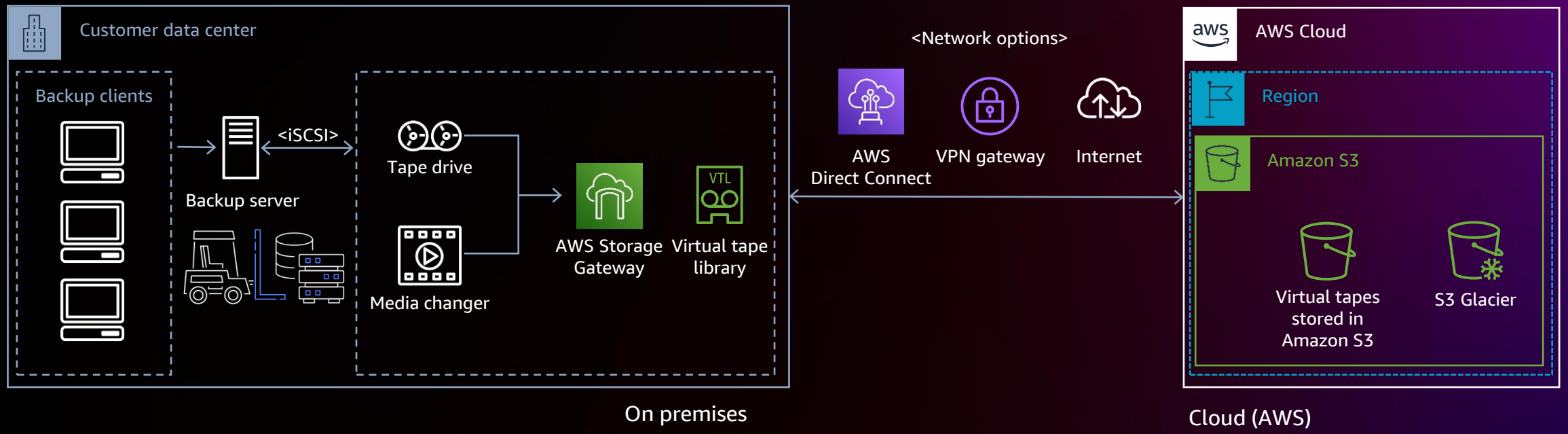
On-premises customer persona



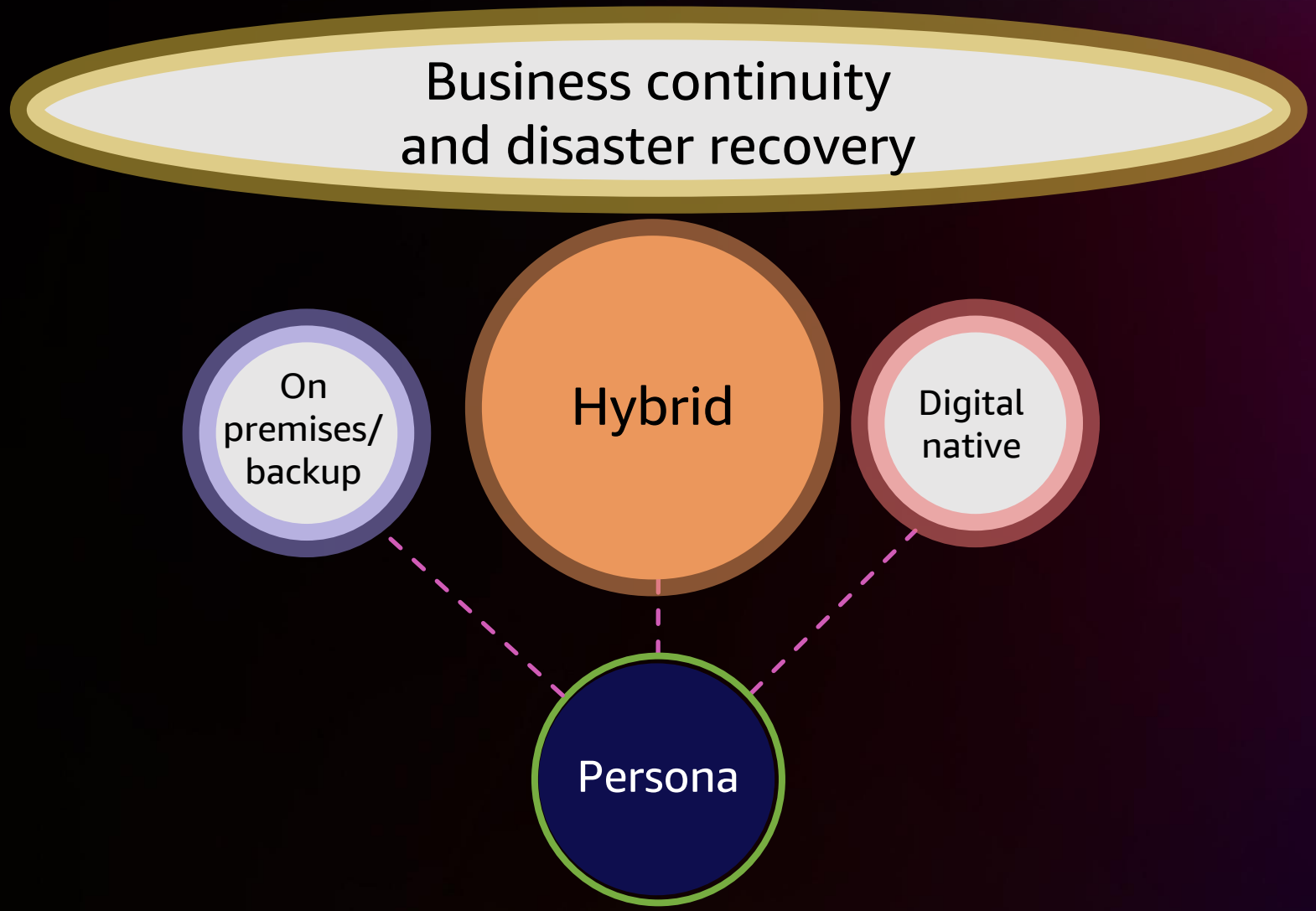
On-premises backup to cloud



Backup: Tape replacement

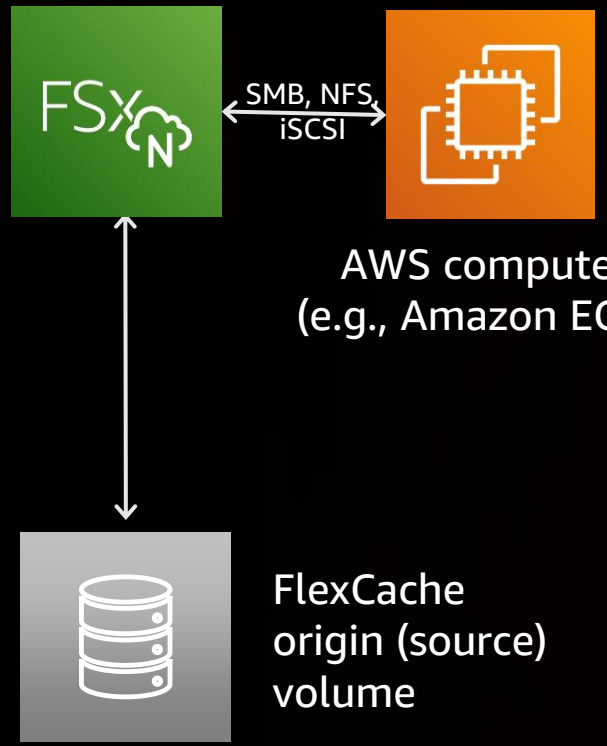


Hybrid customer persona

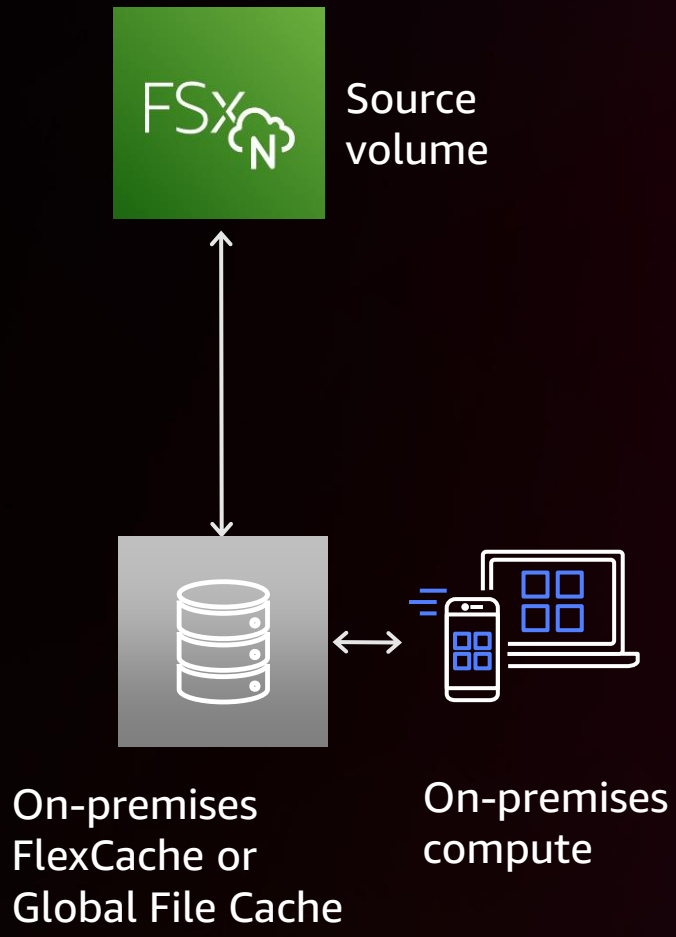


Hybrid storage with Amazon FSx for NetApp ONTAP

Hybrid: Cloud bursting

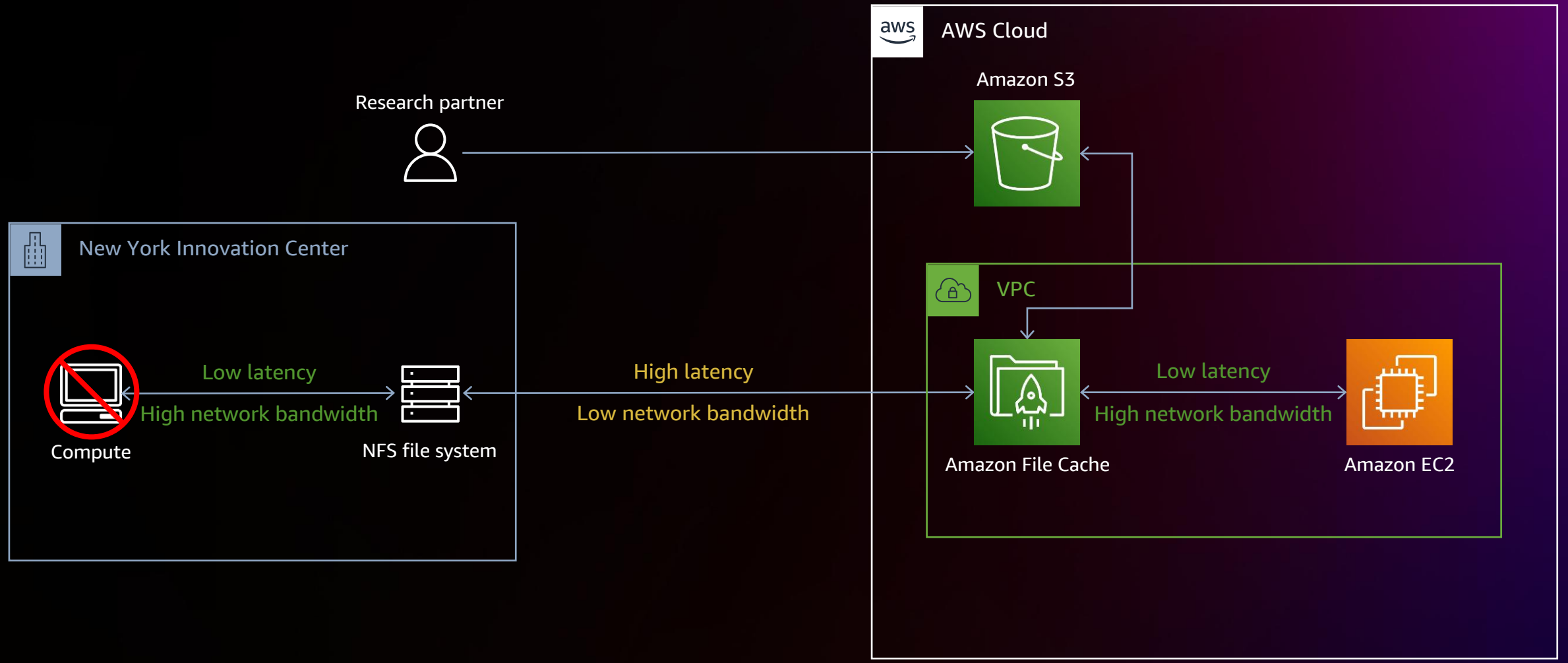


Hybrid: On-premises caching

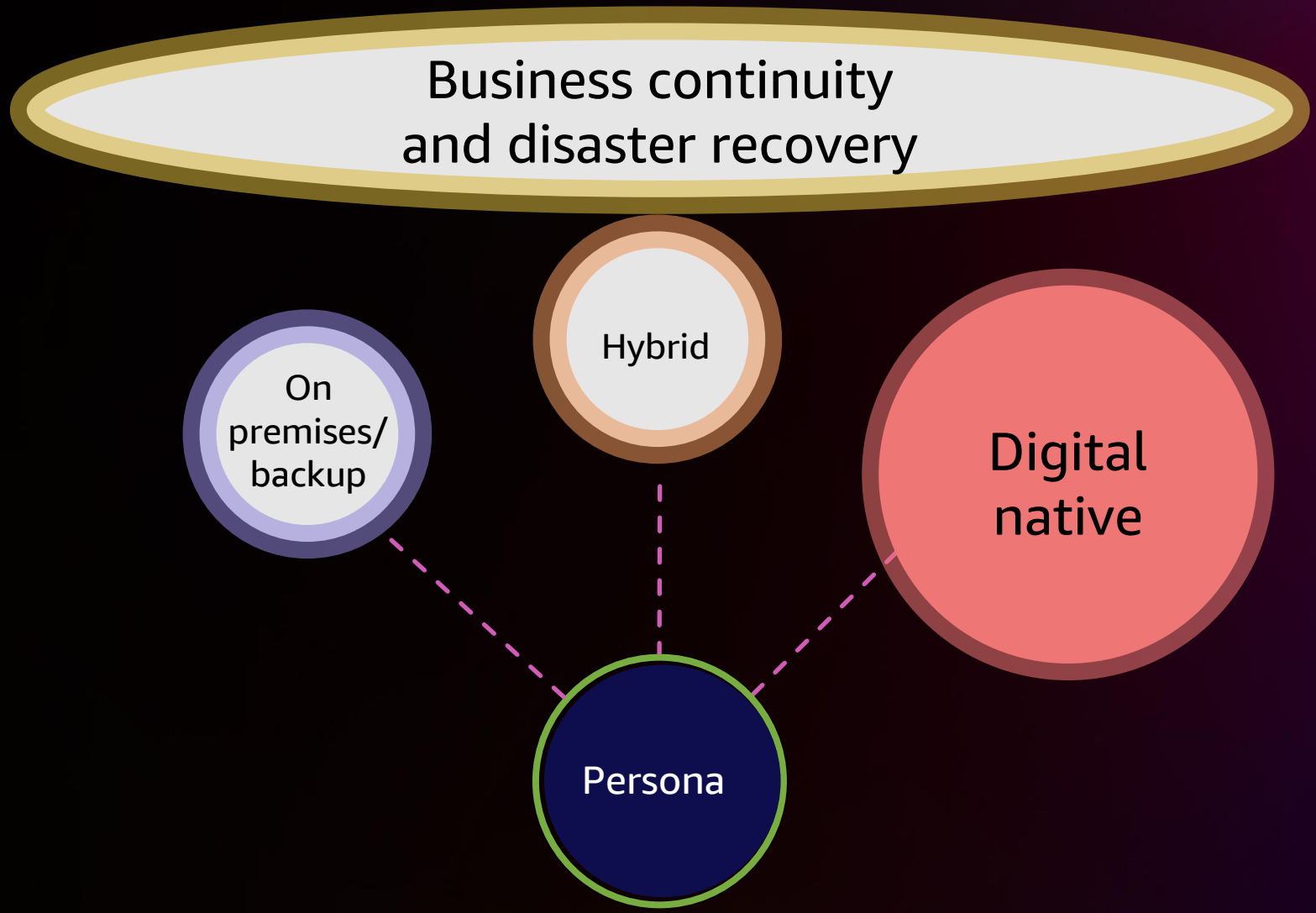


- SnapVault (backup) & SnapMirror (DR) replicate data from source to destination per schedule
- Underlying snapshots can be application consistent with SnapCenter
- The destination is read-only until mirror relationship broken, then can be made read-write for DR use
- Any updates that occur on the destination can be replicated back to the source

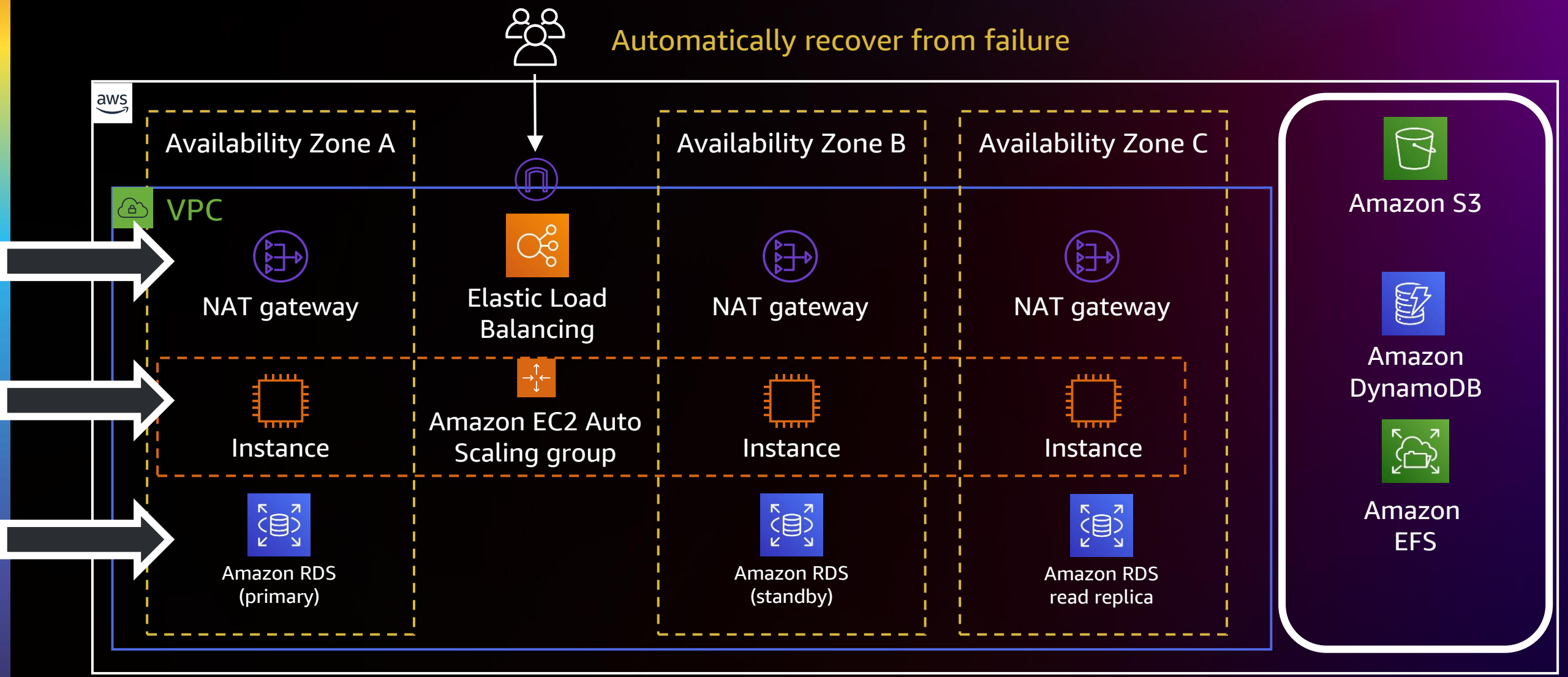
Cloud bursting to accelerate workloads



Digital native customer persona



Three tiers, Multi-AZ for high availability



Serverless on AWS

DATA RESILIENCY EASY-MODE

Serverless is more than compute

Compute


AWS Lambda


AWS Fargate

Data stores


Amazon S3


Amazon Aurora Serverless


Amazon DynamoDB


Amazon EFS

Integration


Amazon EventBridge


Amazon API Gateway


Amazon SQS

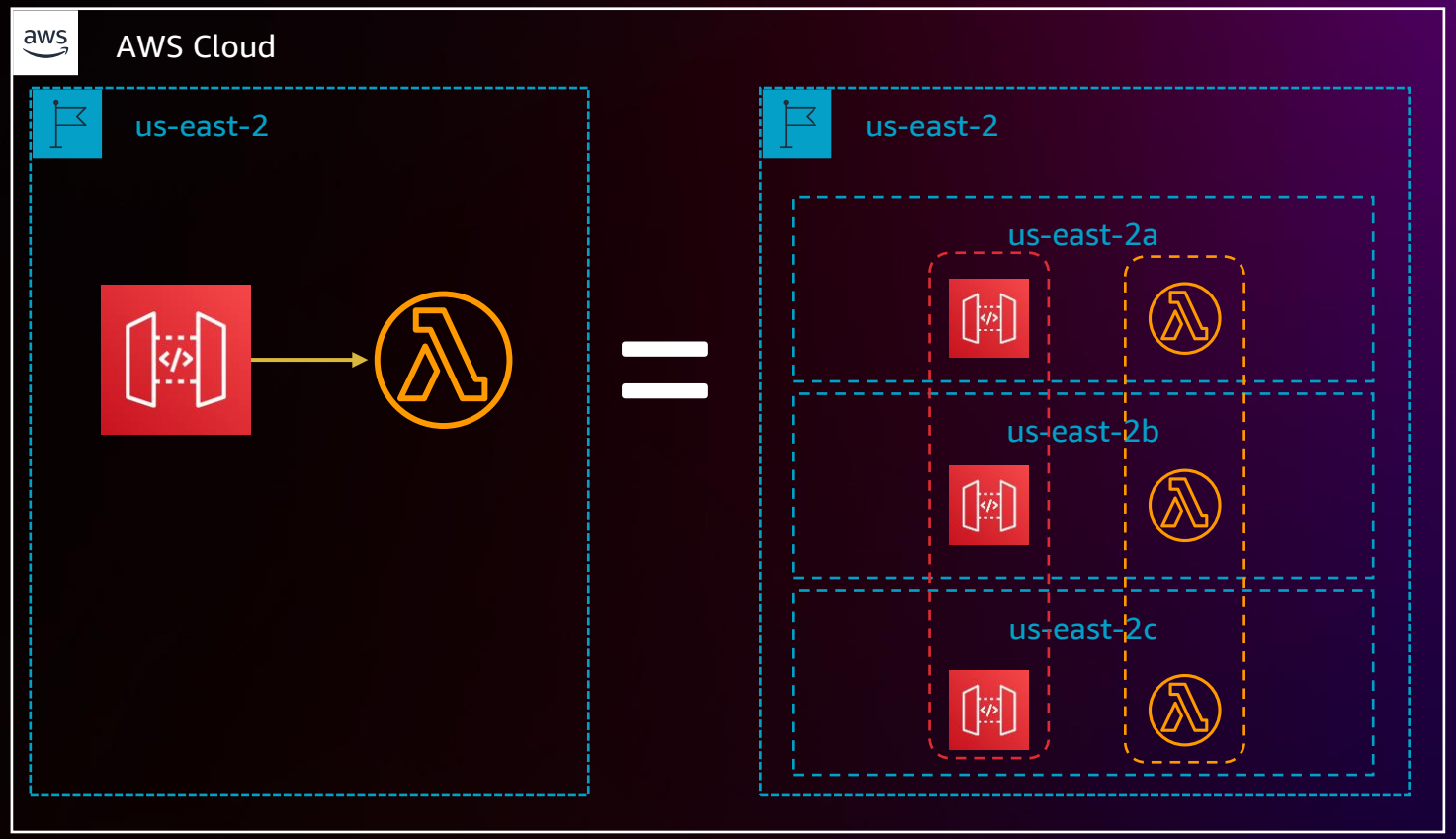

Amazon SNS


AWS Step Functions


AWS AppSync

With serverless architecture, multi-AZ is included

- Regional services
  - High availability
  - Fault tolerant
- Service is responsible for
  - Scaling
  - Health checks
  - Managing failure



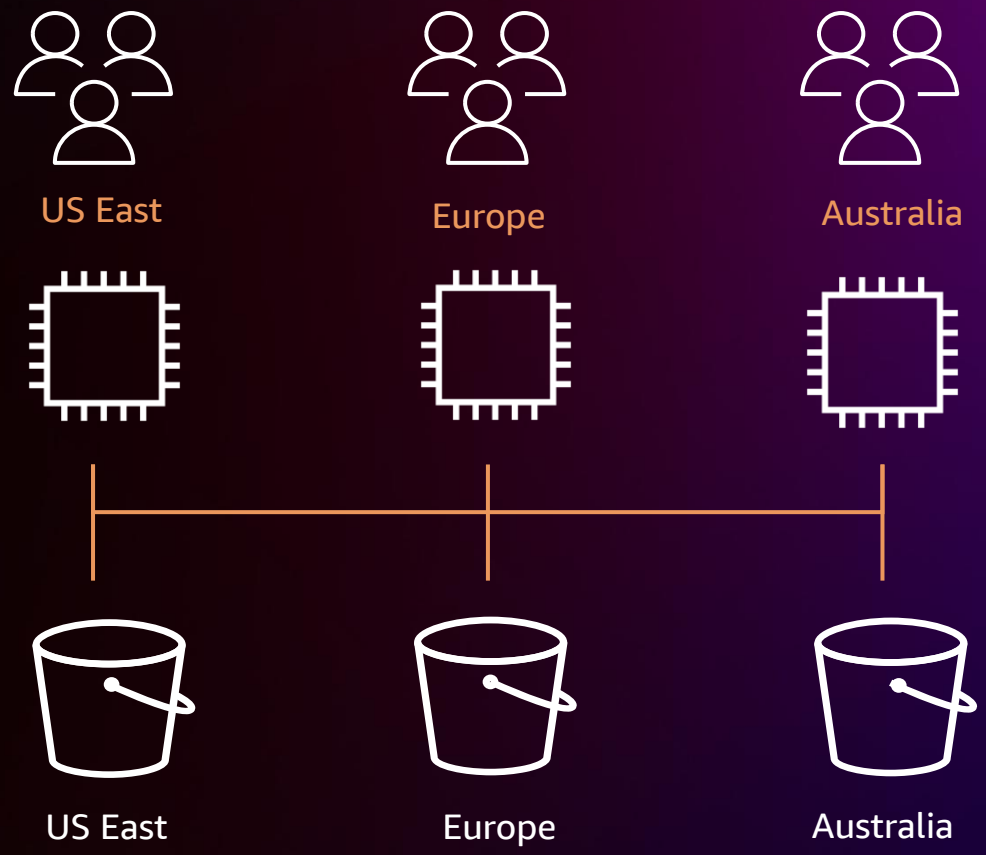
Multi-Region design considerations

Replication services

Challenges addressing multi-Region storage

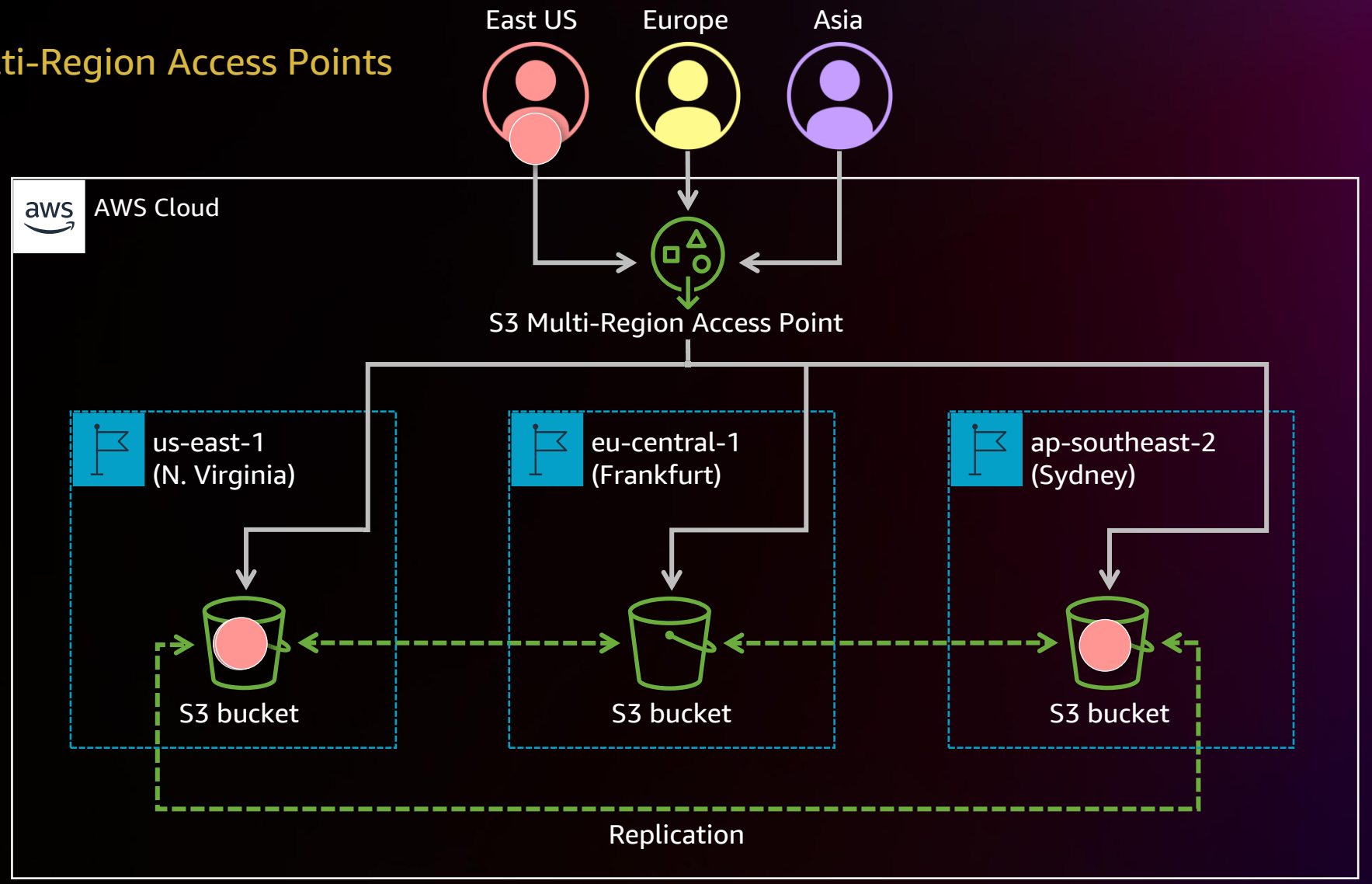
Traditionally, accessing multi-Region storage required **custom regional logic** that routes requests to the closest bucket

The logic became **more complex** when you added **advanced traffic management** such as failover and latency-based routing



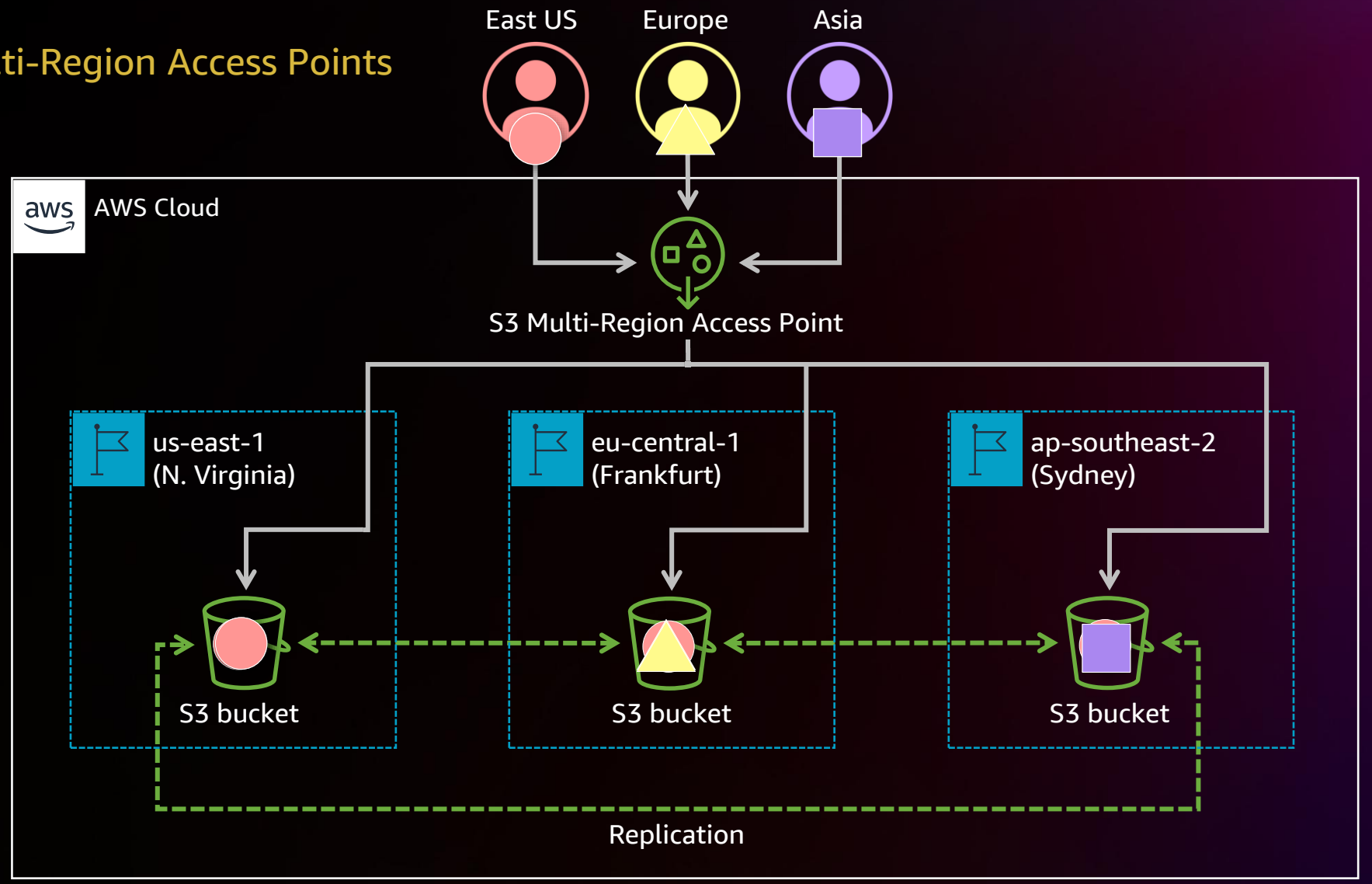
Automatic traffic routing

Amazon S3 Multi-Region Access Points

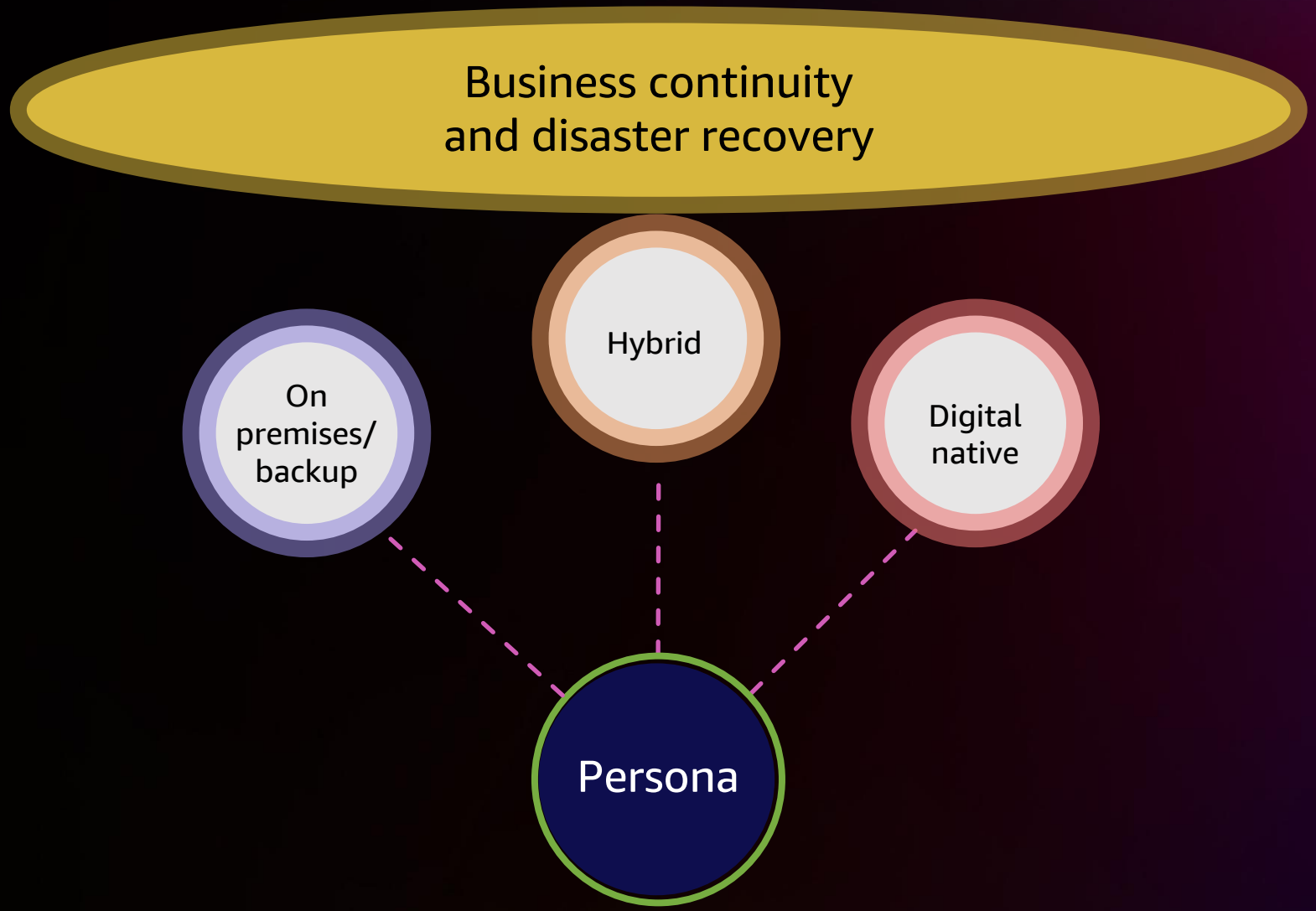


Automatic traffic routing

Amazon S3 Multi-Region Access Points



Protect your data in the cloud



Strategies for disaster recovery

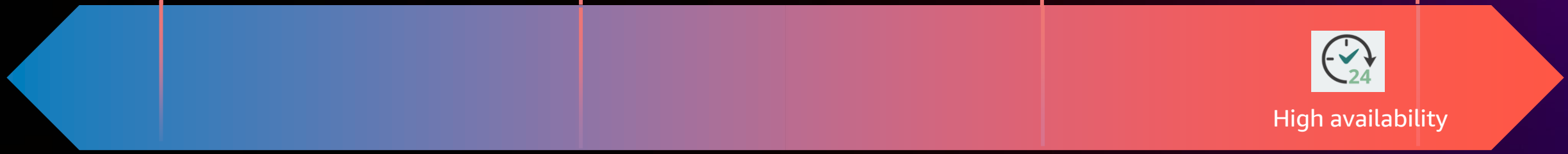
Active/Passive strategies

Backup and Restore

Pilot Light

Warm Standby

Multi-site Active/Active



RPO/RTO: Hours

- Lower-priority use cases
- Provision all AWS resources after event
- Restore backups after event
- Cost $

RPO/RTO: 10s of minutes

- Data live
- Services idle
- Provision some AWS resources and scale after event
- Cost: $$

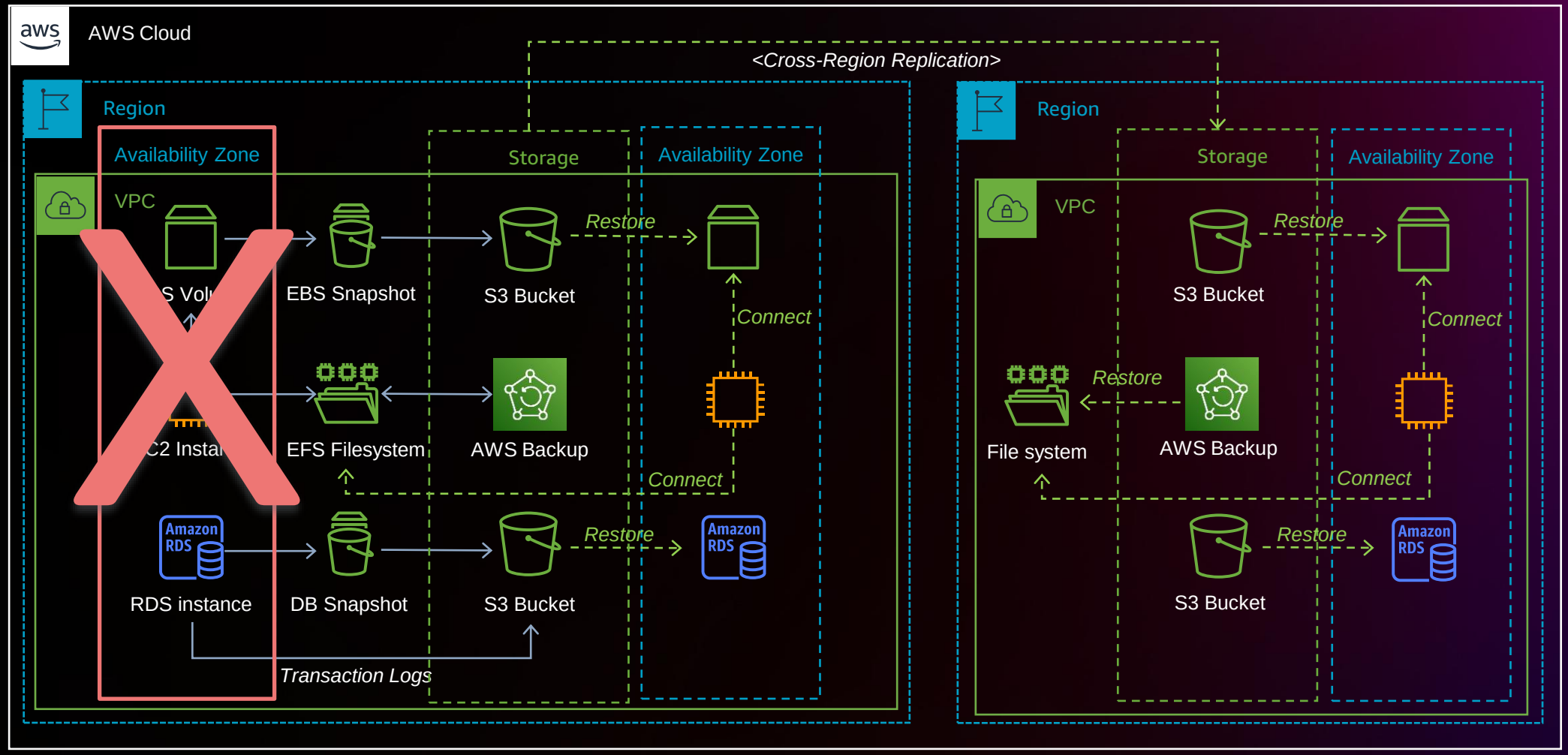
RPO/RTO: Minutes

- Always running, but smaller
- Business critical
- Scale AWS resources after event
- Cost $$$

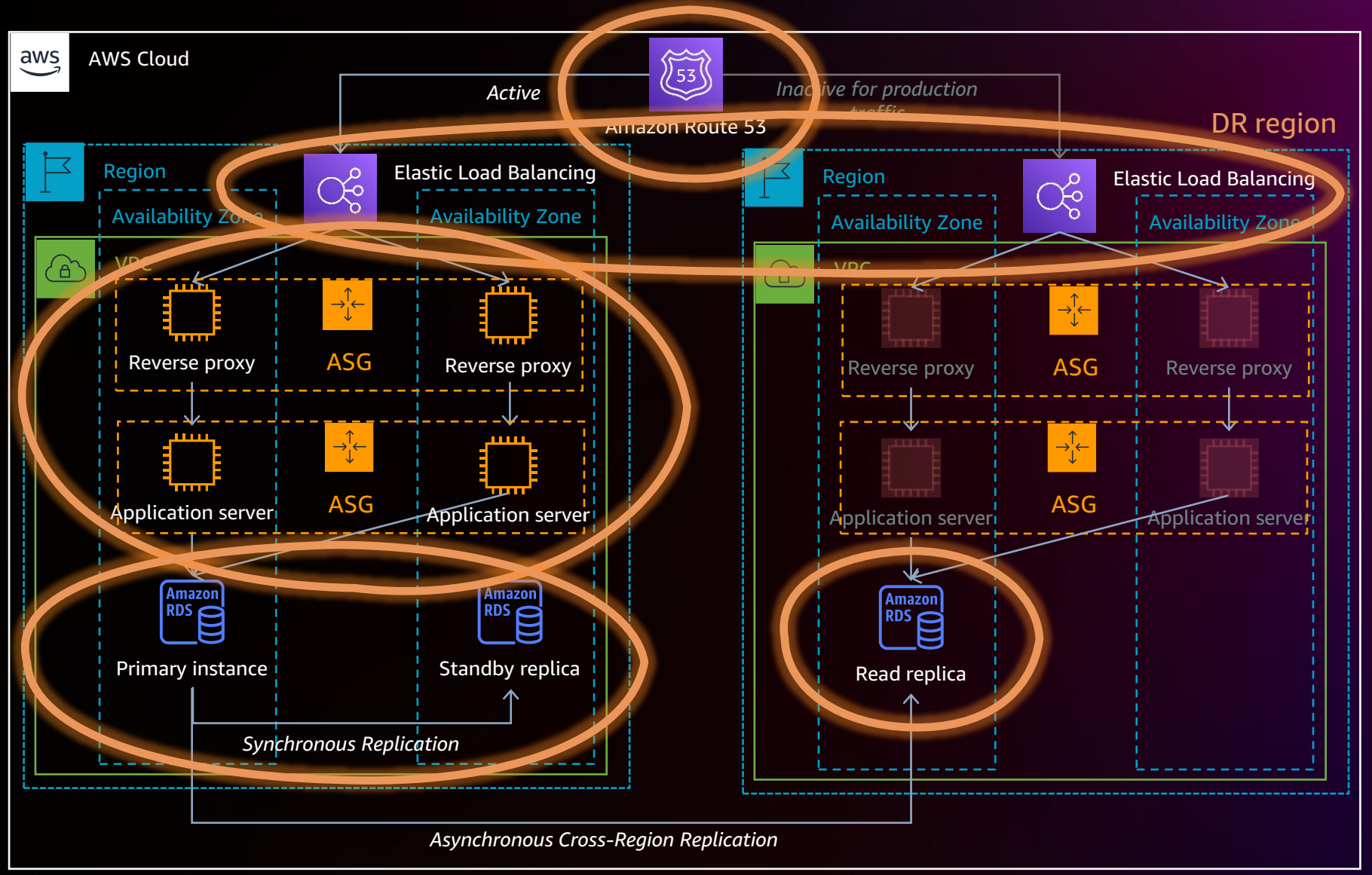
RPO/RTO: Real time

- Zero downtime
- Near-zero data loss
- Mission-critical services
- Cost $$$$

Disaster recovery: Backup & Restore

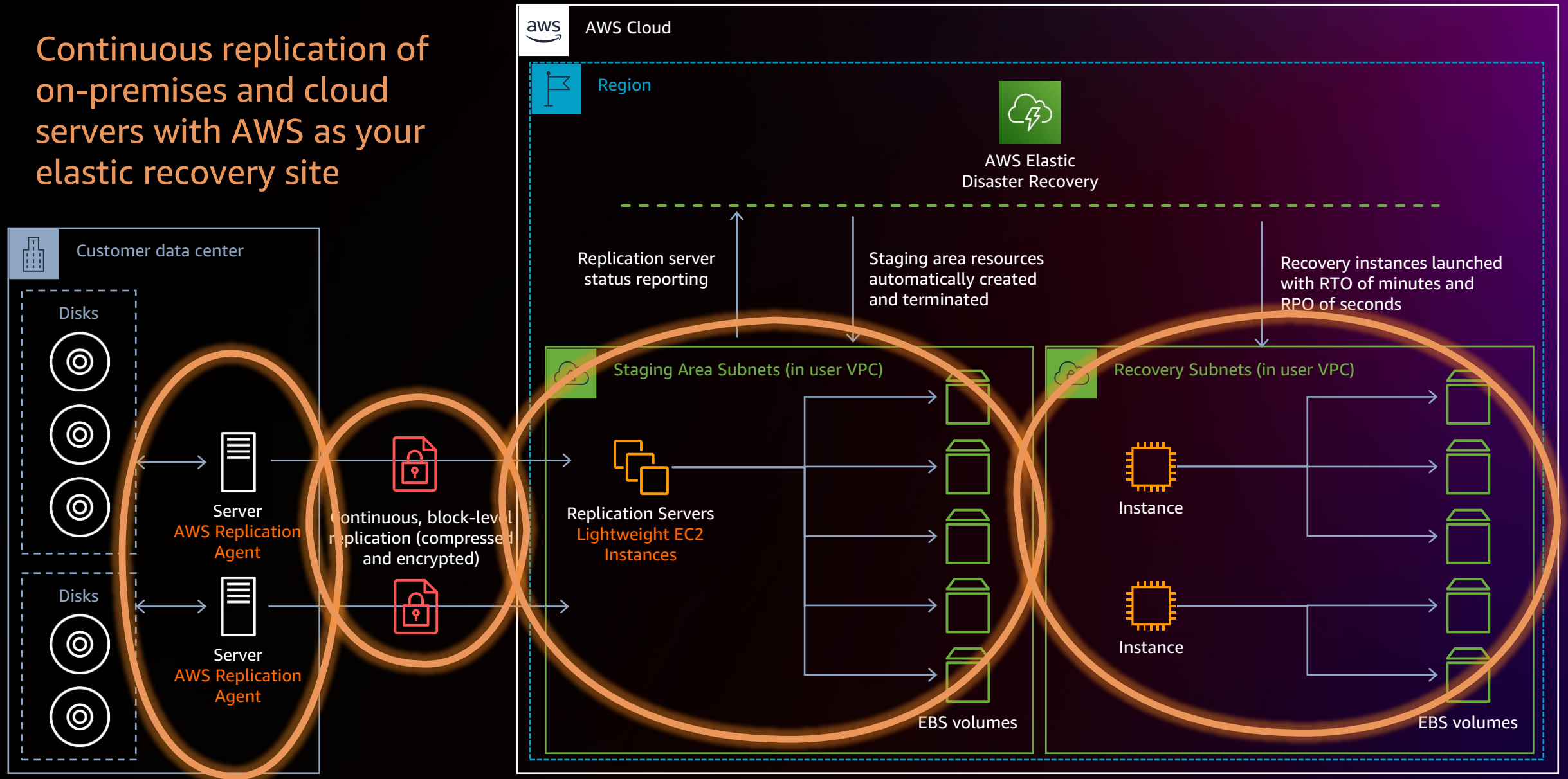


Disaster recovery: Pilot Light



Disaster recovery: Pilot Light (Hybrid)

Continuous replication of on-premises and cloud servers with AWS as your elastic recovery site



What’s new in AWS DRS?

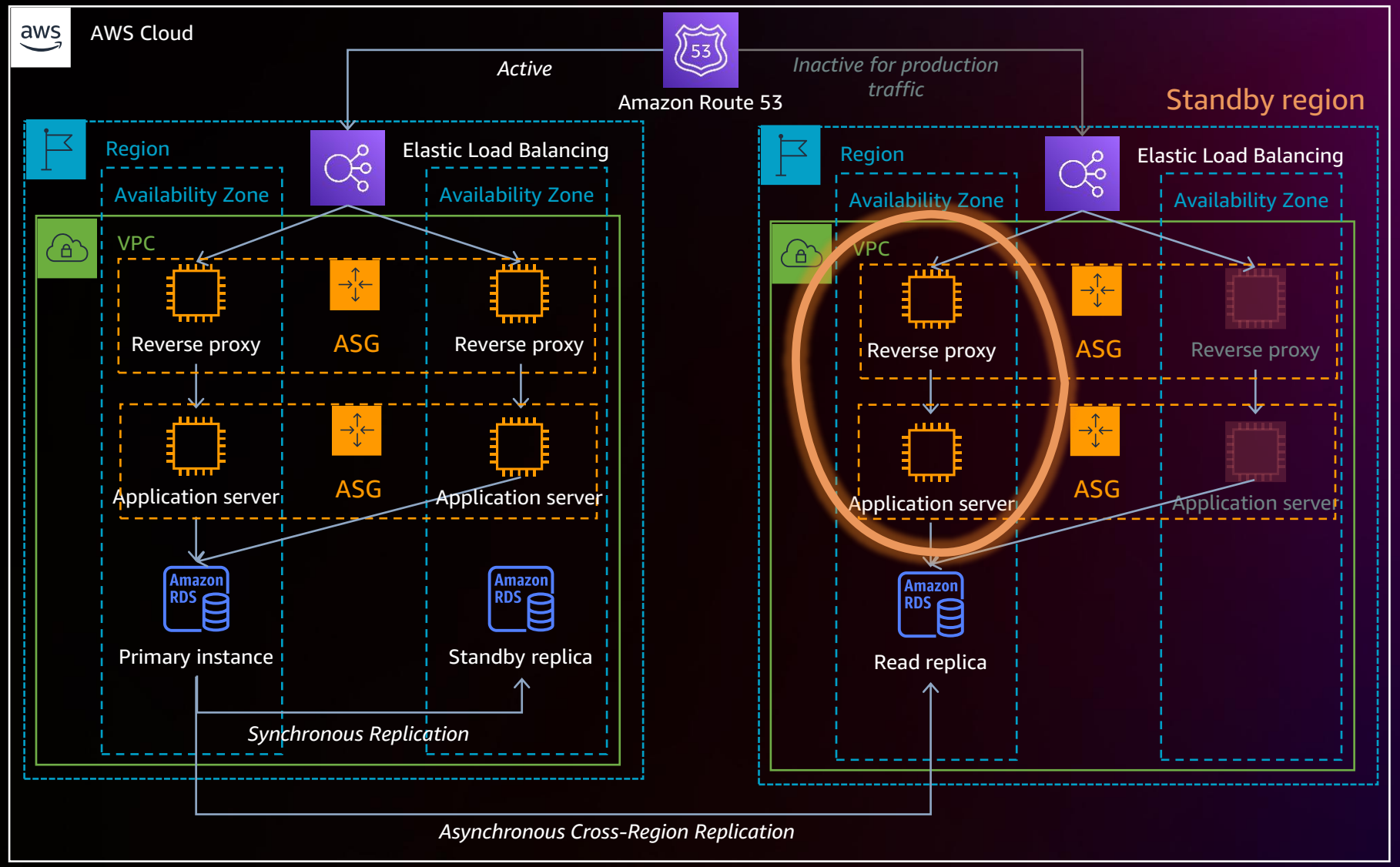
re:Invent

IN-AWS FAILBACK

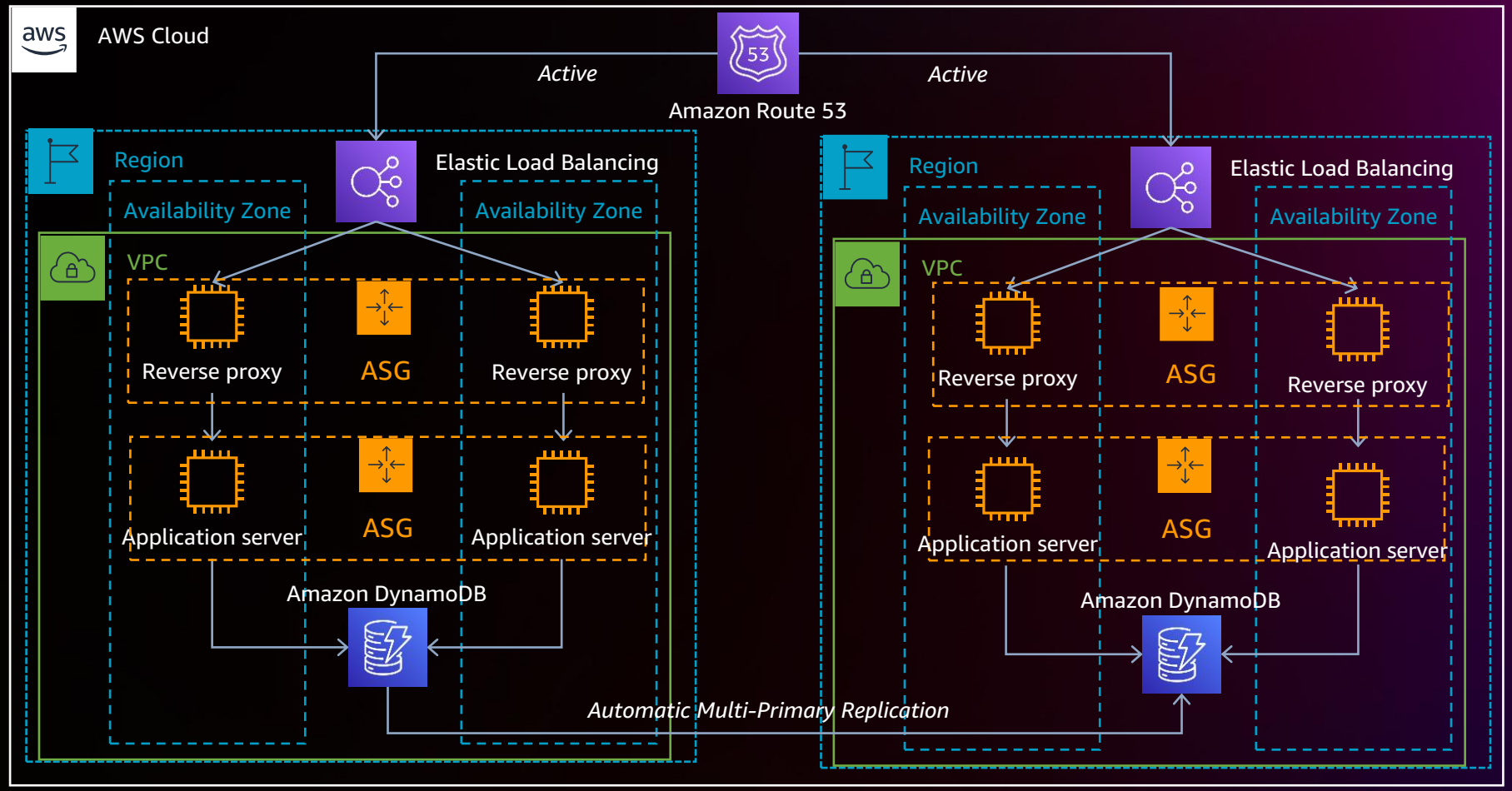
Customers that use AWS DRS for cross-Region or cross-AZ replication and recovery need a simple way to failback at scale

We have launched the ability to failback between AWS Regions and availability zones using the AWS DRS console or APIs

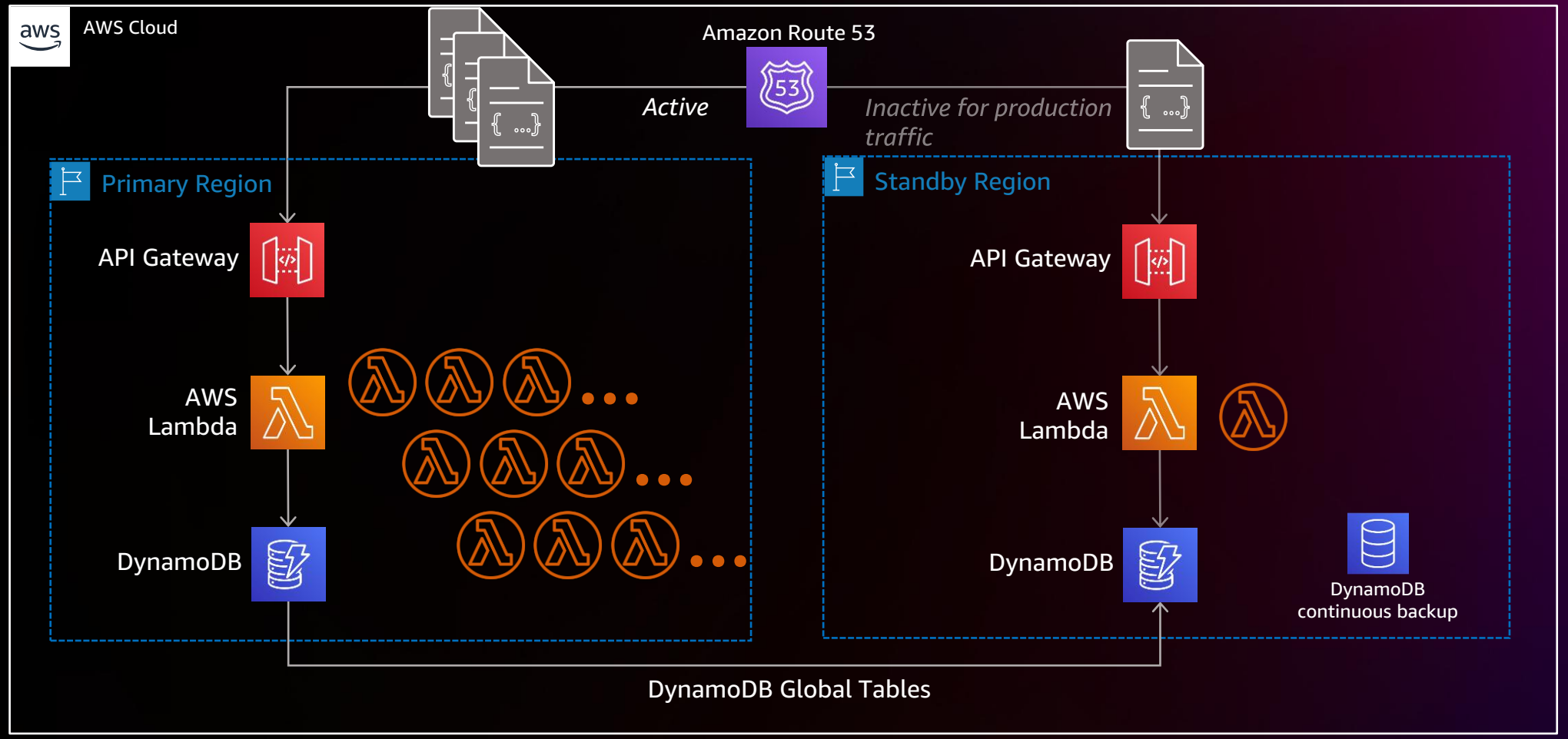
Disaster recovery: Warm Standby



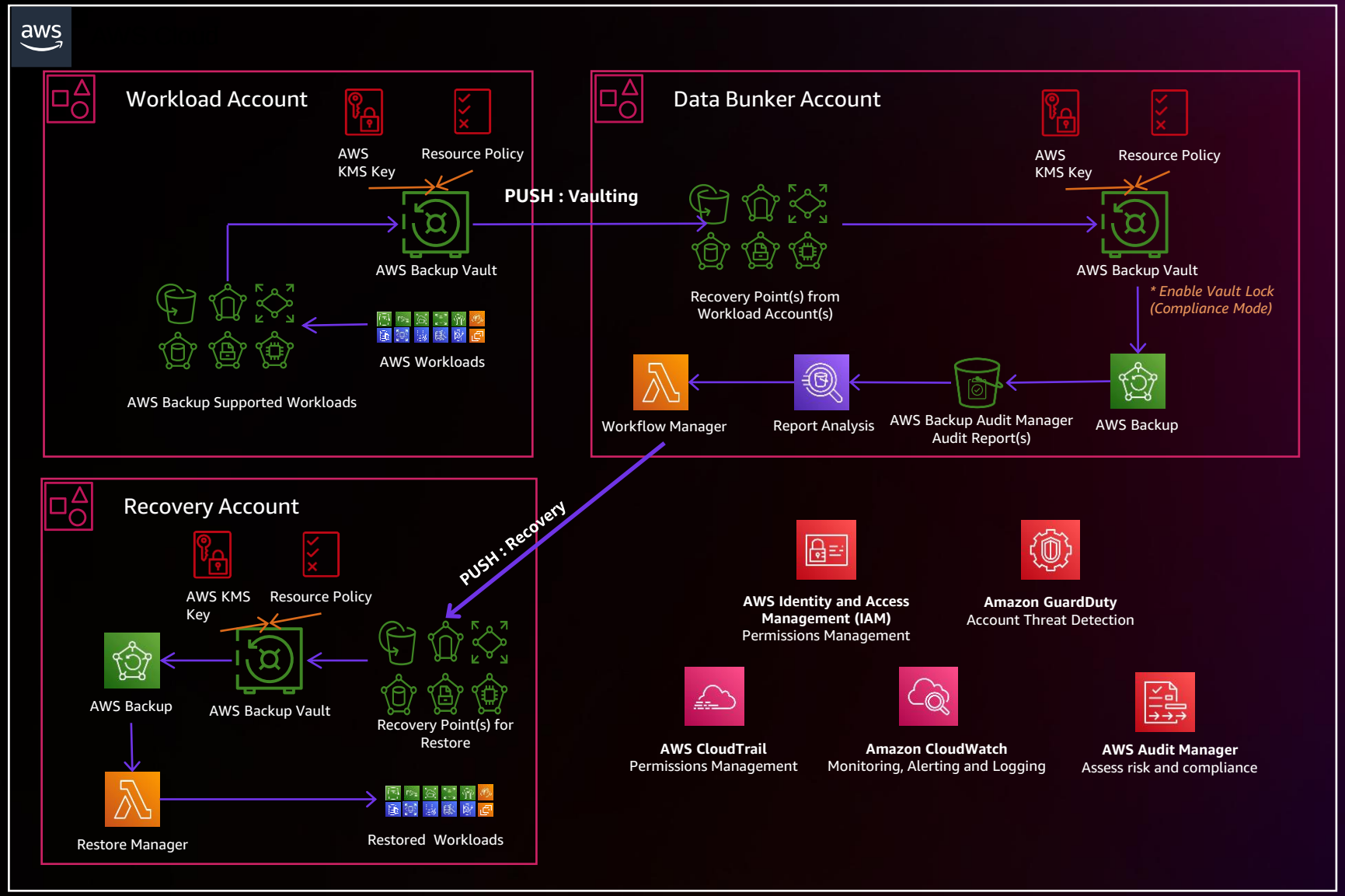
Disaster recovery: Multi-Region Active/Active



Disaster recovery: Serverless

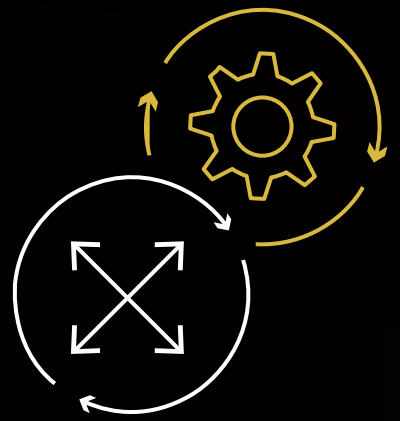


Ransomware Recovery Design Pattern



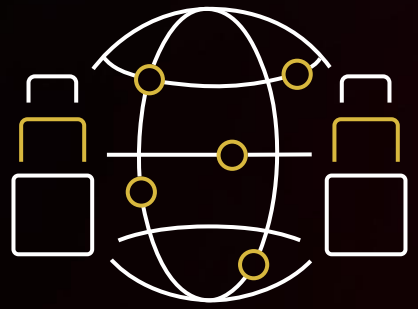
Bringing it all together

AWS WELL-ARCHITECTED

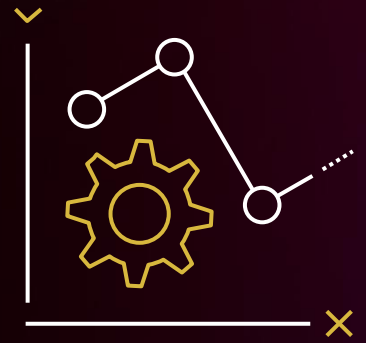


Operational excellence

Security



Reliability



Performance efficiency

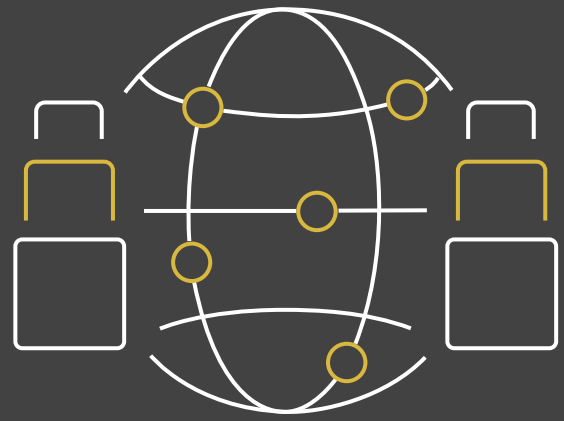
Cost optimization

Testing resiliency

Resiliency
"The ability of a workload to recover from infrastructure or service disruptions . . ."

Design principles for reliability

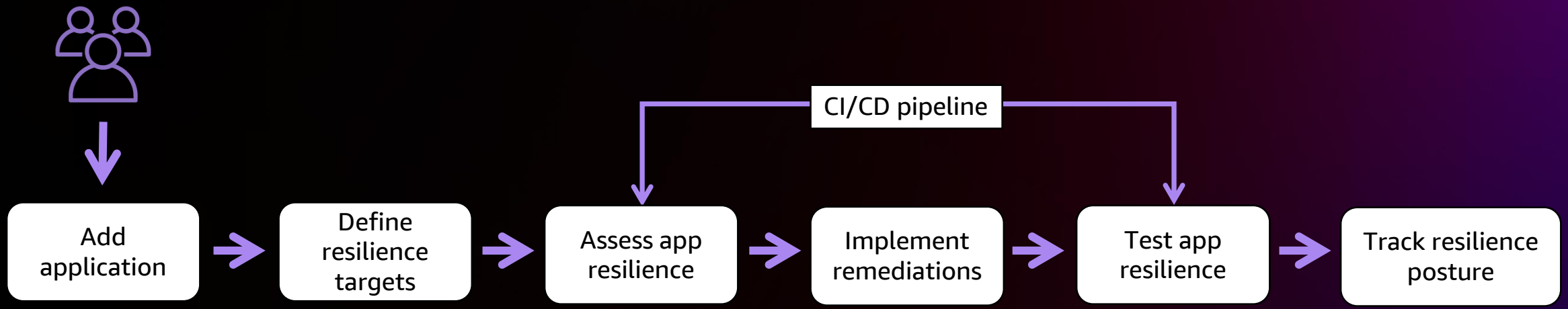
- Automatically recover from failure
- Test recovery procedures



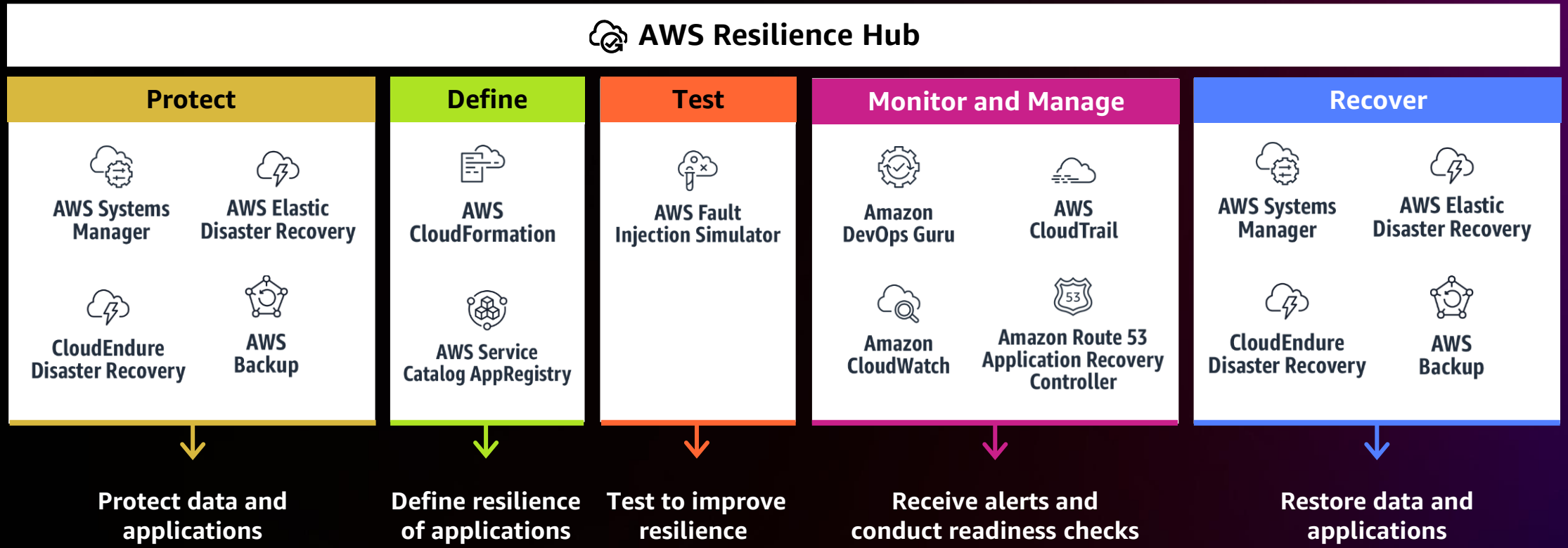
http://bit.ly/reliability-pillar

What is AWS Resilience Hub?

An application resilience service that provides customers a central place to define, validate, and track the resilience of their applications on AWS

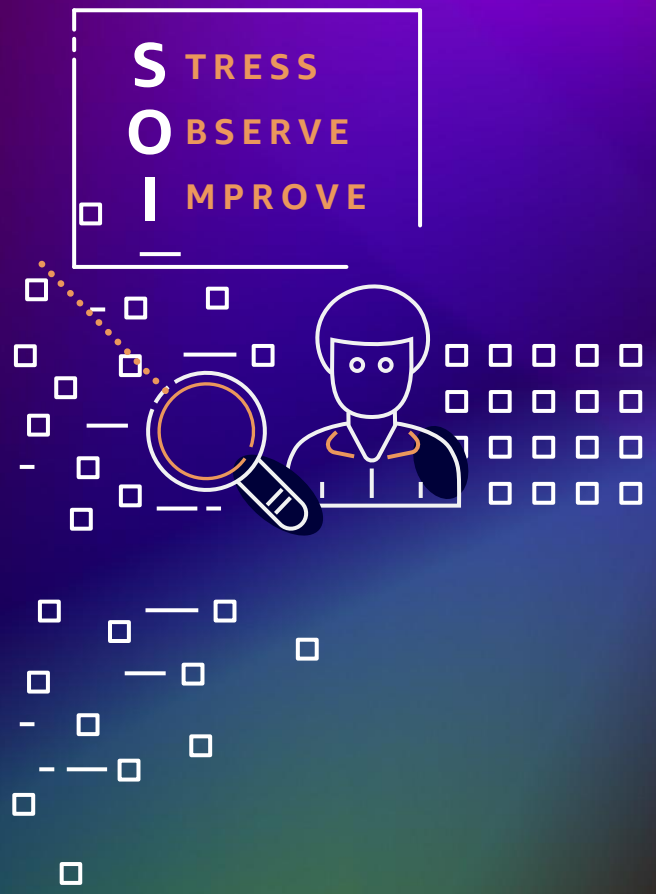


AWS Resilience Services



Chaos engineering is the process of stressing an application by creating disruptive events, observing how the system responds, and implementing improvements

With AWS Fault Injection Simulator



Game days

SIMULATE FAILURE OR EVENT TO TEST SYSTEMS RESILIENCY, PROCESSES, AND TEAM RESPONSES

People

Cross-discipline team

Processes

Briefing

Overview

Roles

Planning

Preparation

Hypothesis

Execution

Run experiment

Analysis

Verify

Improve

Resources

STG208:	Protect against ransomware with a Zero Trust architecture
STG221-L:	AWS storage innovations at exabyte scale
STG312-R1:	Build a disaster recovery solution with AWS storage services
STG324-R:	Protect AWS resources with AWS Backup

Whitepaper: “Disaster Recovery of Workloads on AWS: Recovery in the Cloud”

https://bit.ly/DR_AWS

AWS Well-Architected hands-on labs

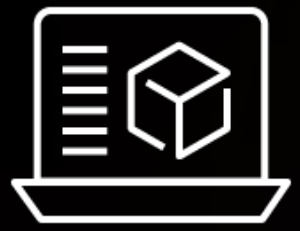
https://wellarchitectedlabs.com/reliability/

AWS Architecture Blog: Disaster Recovery Series

https://bit.ly/aws-dr-blog

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**

https://aws.training/storage

Thank you!

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