

The background features a dark blue gradient with large, overlapping, semi-transparent shapes in shades of purple and magenta. Two thin, light blue lines intersect diagonally across the scene. The text is positioned on the left side of the image.

AWS re:Invent

DECEMBER 2 - 6, 2024 | LAS VEGAS, NV

IMP204

Fortifying the news pipeline: AP's resilient media supply chain on AWS

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Agenda

1. AWS and resilience
2. The Associated Press modernization and resilience journey
3. Build resilience into your workloads on AWS
4. AWS Services to help build Resilience

AWS and resilience





Resilience is
about planning
for a bad day.

“Everything fails,
all the time.”

Dr. Werner Vogels, CTO Amazon

Downtime is expensive



Revenue



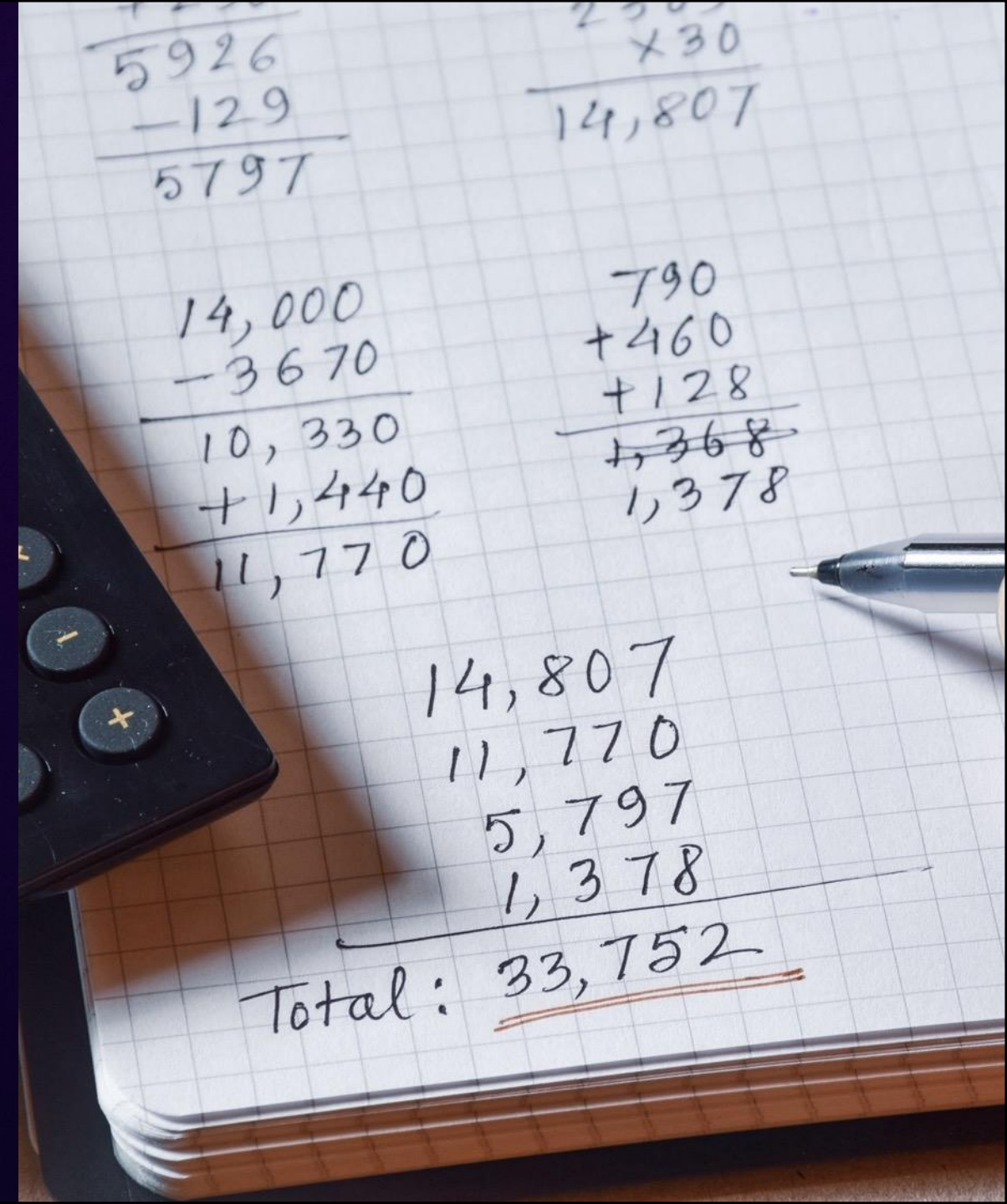
Brand



Productivity



Regulatory





The ability of a workload to recover from infrastructure or service disruptions, dynamically acquire computing resources to meet demand, and mitigate disruptions, such as misconfigurations or transient network issues.

Resilience pillar

AWS Well-Architected Framework

AWS shared responsibility model for resilience

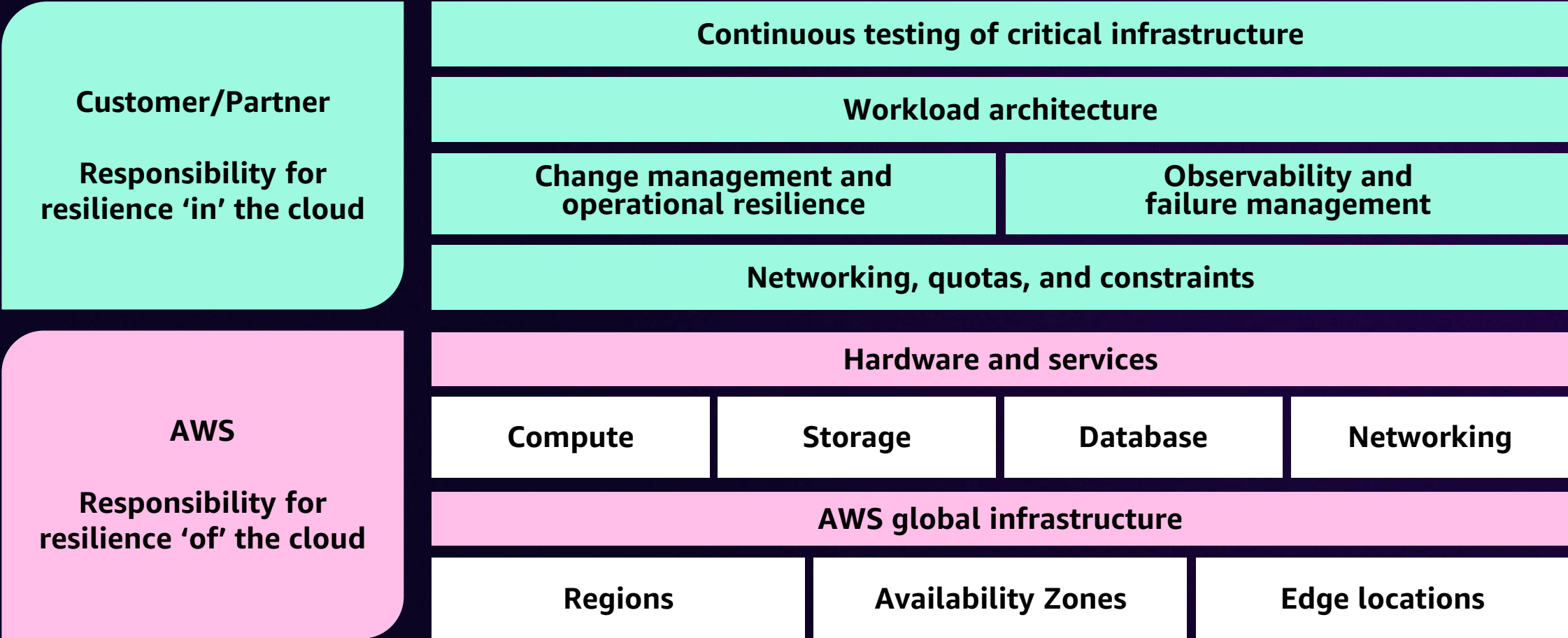


AWS is responsible for
the resilience
of the cloud



Customers/Partners are
responsible for
their resilience
in the cloud

Shared responsibility model for resilience

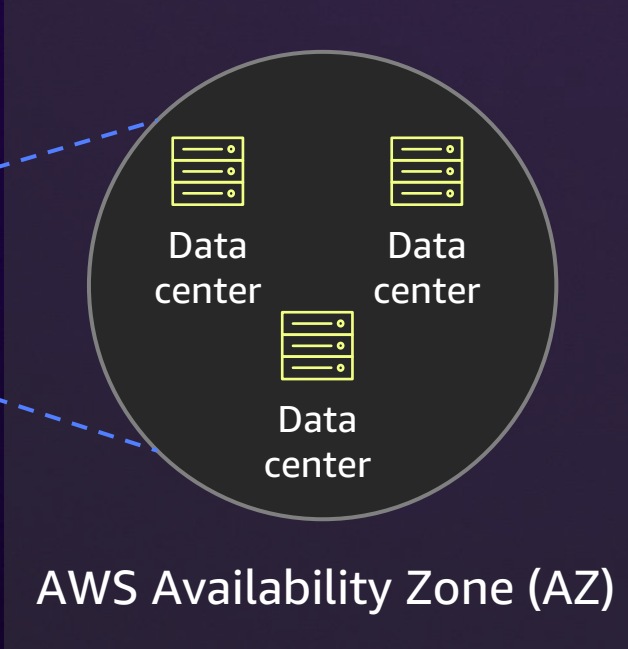
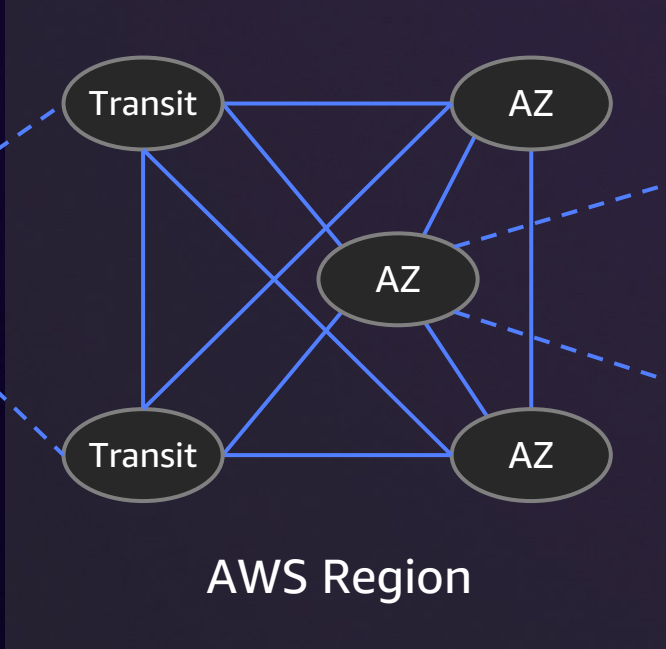


Is multi-region necessary?

 Are you well-architected?

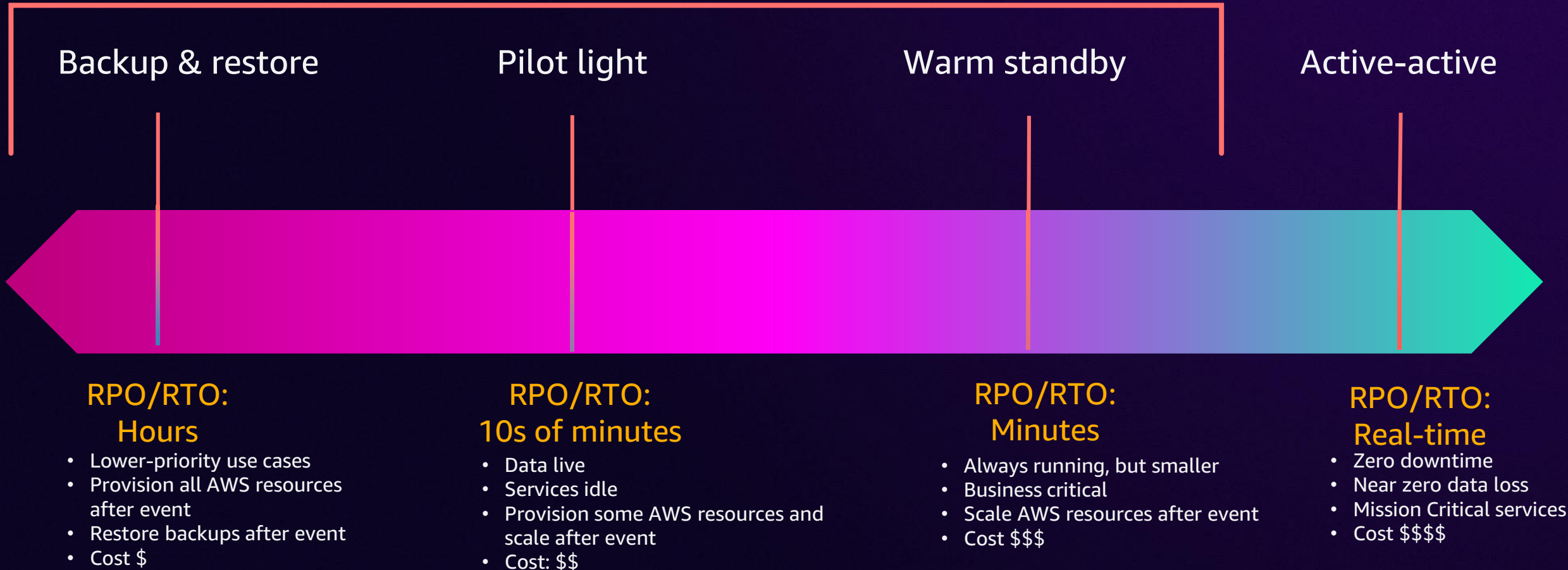


-  AWS Regions
-  Announced Regions



Multi-region: Strategies for disaster recovery

Active/Passive strategies



Key takeaways



App modernization
innovation curve
accelerates beyond
lift and shift



Multi-region for
resilience requires careful
evaluation



Aggressively pursue
simplicity (multi-region
is hard enough)

The Associated Press modernization & resilience journey



THE ASSOCIATED PRESS



AP today remains the most trusted source of fast, accurate, unbiased news in all formats and the essential provider of the technology and services vital to the news business.

REACH

Four billion people see AP journalism every day

FOOTPRINT

Journalists in nearly 100 countries and in all 50 U.S. states

VALUES

Accurate, fact-based, nonpartisan reporting

The AP logo consists of the letters 'AP' in a bold, black, sans-serif font, positioned above a solid red horizontal bar.

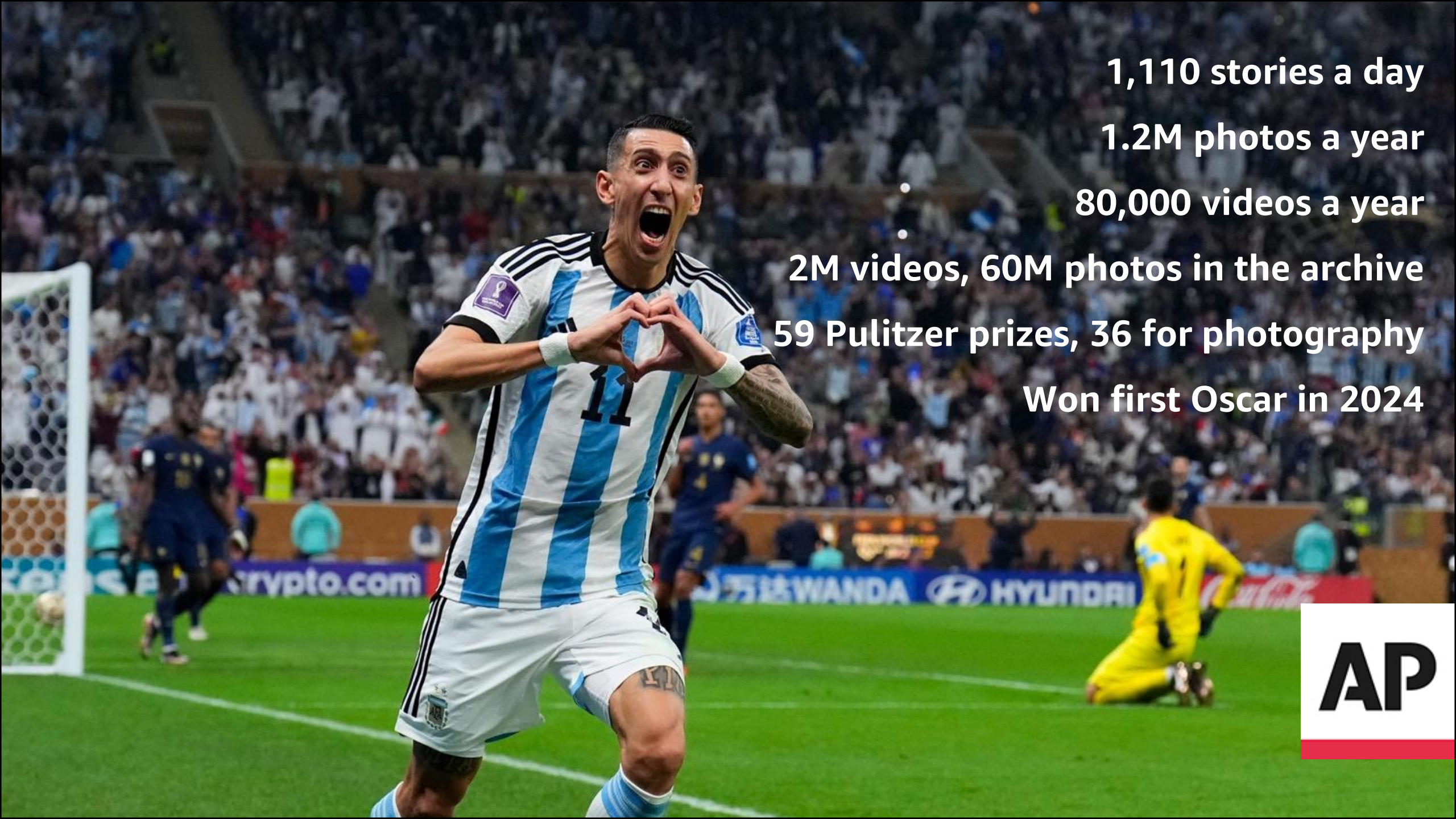
War, the telegraph, and the Pony Express

Montgomery Ala. by — Riddle
~~then~~ during the existence of the
Mexican War in 1846-7 the
payment for which was conditioned
upon a daily gain of 24 hours
upon the regular mail.

This contract was made by
Mr Beach in behalf of Mr Beach
for the benefit of the Sun, but
on its completion Mr Beach
offered an equal interest to each
of the other papers. first (and

This offer was accepted (without
a word of hesitation) by Mr Hallock
for the Journal of Commerce.





1,110 stories a day

1.2M photos a year

80,000 videos a year

2M videos, 60M photos in the archive

59 Pulitzer prizes, 36 for photography

Won first Oscar in 2024



Technology vanguard





The AP technology platform

BREAKING NEWS
DACA PROGRAM TO BE WOUND DOWN
11:49:32 GMT
11:49:32 NYC

BIZ LEAD DEFENSE
Wend Hastings, Penny Pritzker, Steve Hoffman, Marc Benioff, Evan Spiegel, Jack Dorsey, Jeff Lawson, Alfred Kelly, Jr., Tom Sloan, Sam Altman, Kevin Johnson

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ABC Live 2

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ABC Live 100



Serverless supply chain

Region



Amazon Elastic Container Service (Amazon ECS)

Front Ends



Amazon API Gateway



AWS Lambda



AWS Lambda




AWS Lambda




AWS Lambda

Microservices




Amazon Simple Storage Service (S3)



Amazon Simple Notification Service



Amazon Simple Queue Service



DynamoDB Global Table

Storage and Pub/Sub



AWS Lambda



AWS Lambda



AWS Lambda



AWS Lambda

Event Driven Workloads



EVEN WHEN THE NEWS IS FREE, JOURNALISM IS NOT. SUPPORT INDEPENDENT, FACT-BASED JOURNALISM. DONATE

USWNT wins its fifth Olympic gold medal in women's soccer with a 1-0 victory over Brazil in final



Details Linked Media (20) Preview

apeterson x kmaquire x sptq x

USWNT wins its fifth Olympic gold medal in women's soccer with a 1-0 victory over Brazil in final

AP-OLY-SOC-Brazil-US, 7th Ld-Writethru

Photo (20)

PARIS 2024 SUMMER GAMES

126 medals

91 medals

1. USA	40	44	42
2. CHN	40	27	24

Team search

TEAM	Gold	Silver	Bronze	TOTAL
3. GBR	14	22	29	65
4. FRA	16	26	22	64
5. AUS	18	19	16	53

1 of 20 | Mallory Swanson, of the United States, up, celebrates with Lindsey Horan, of the United States, after scoring her side's first goal during the women's soccer gold medal match between Brazil and the United States at the Parc des Princes during the 2024 Summer Olympics, Saturday, Aug. 10, 2024, in Paris, France. (AP Photo/Vadim Ghirda)



The need to modernize, act 1

- The burden of data centers affects delivery capability and puts a ceiling on innovation.
- Engineers design solutions in the shadow of sunk costs.
- Lift and shift moved the bar. But how far?



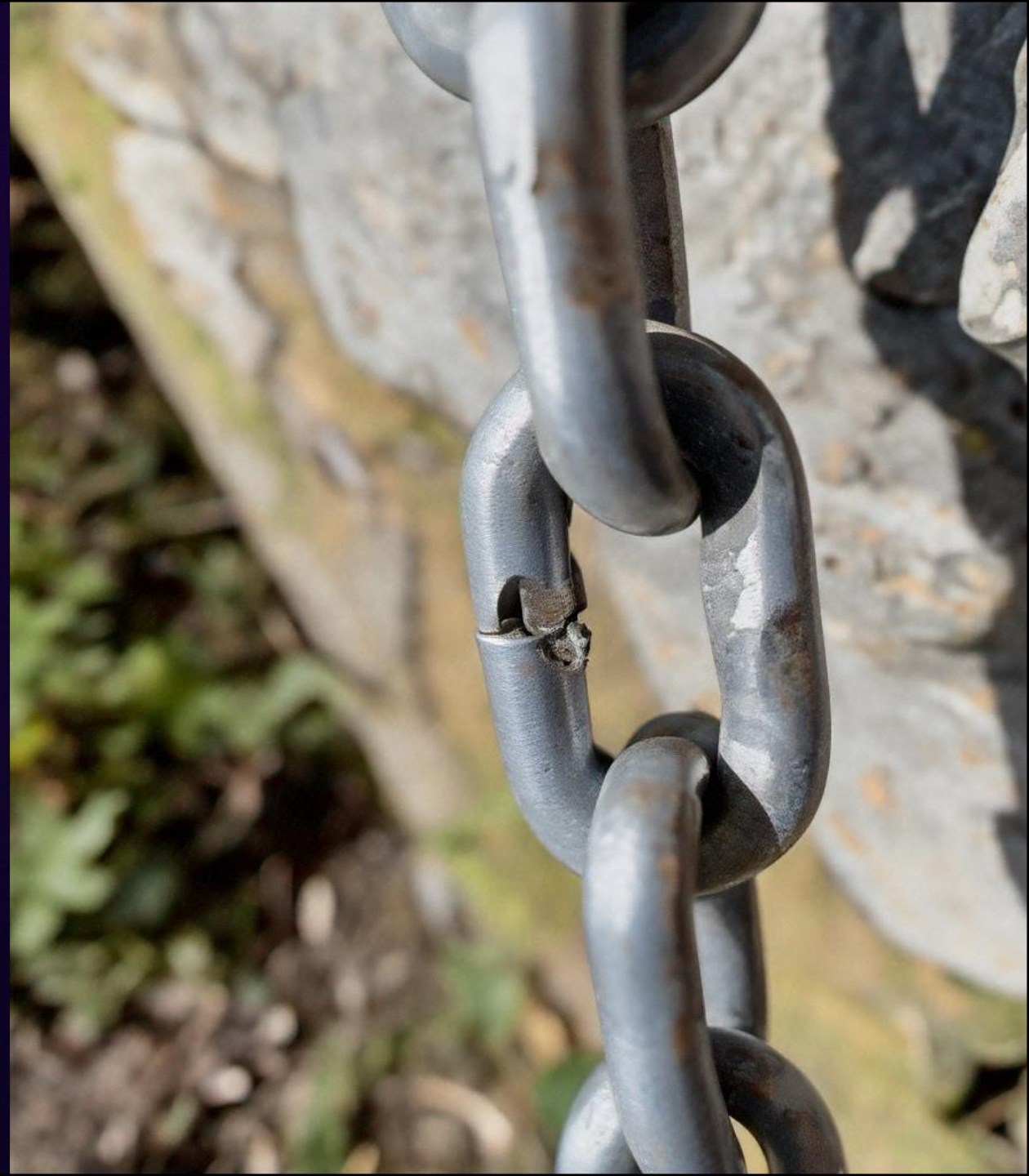
The need to modernize, act 2

- Modern applications are cloud-native
- Cloud native software design led us to serverless patterns
- Running serverless stacks pushed us to multi-region



Shifting risk

- Outages tend to be software based, not hardware
- Services have a higher degree of interconnectivity within a region
- Software oriented outages can be longer than hardware



Assessing multi-region fit



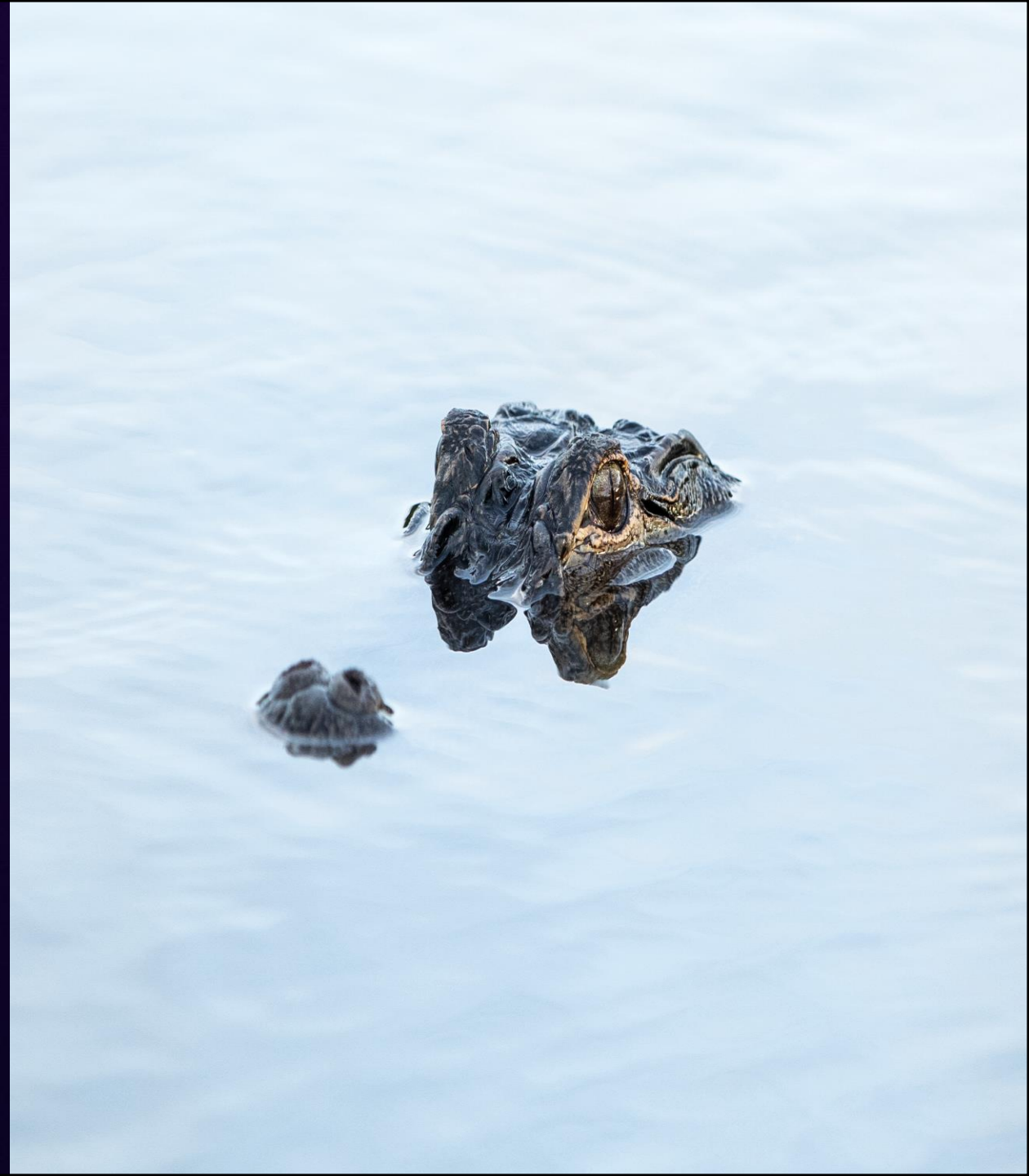
- Data replication latency tolerance?
- Okay with eventual consistency?
- Is regional decoupling practical?
- Can you build in two regions?

Regional synchronization

Data replication is hard. Do it simply, do it well, do it once.

Nonlinear complexity increase with more replication points.

Handling data inconsistencies across data stores is a dark place.

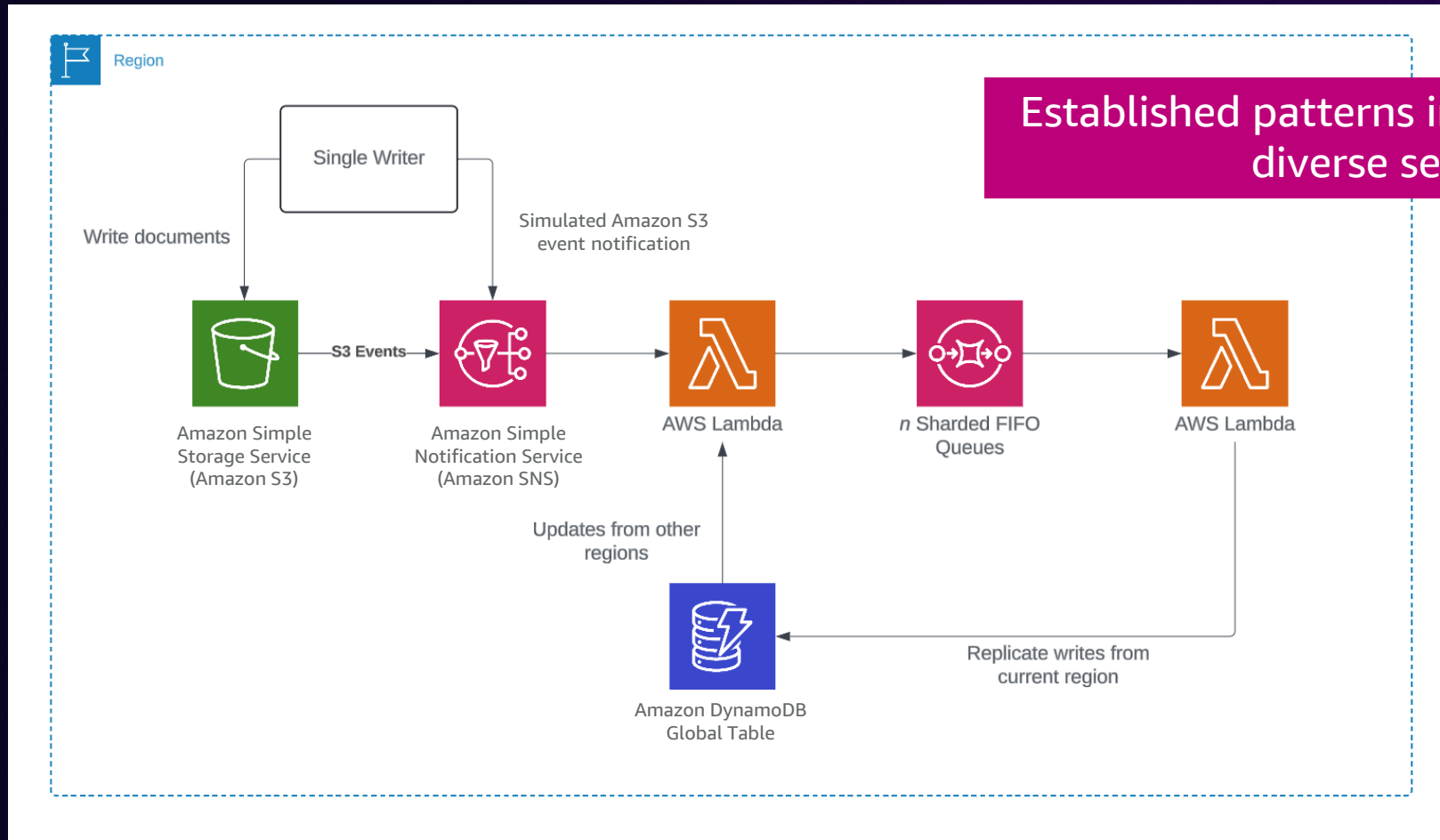


Latency tolerance for replicated data

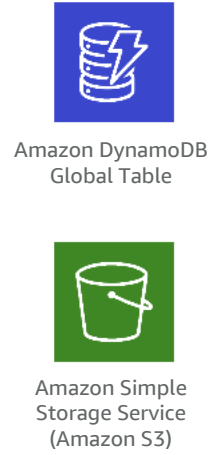
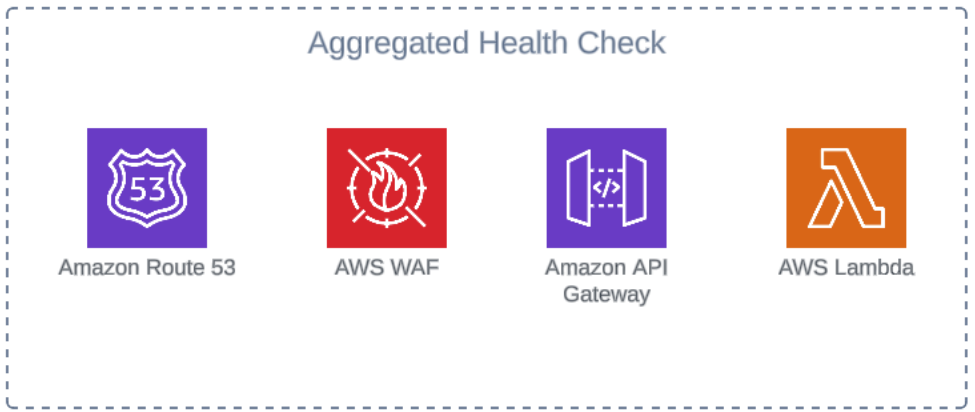
Our first solution did not meet AP's latency tolerance. Observations:

1. Within region, Amazon S3 events can take minutes, especially under high volume of operations.
2. Amazon S3 cross region replication SLA (99.99% within 15 minutes) doesn't meet our replication tolerance.

Pattern: Emulate Amazon S3 cross region for speed



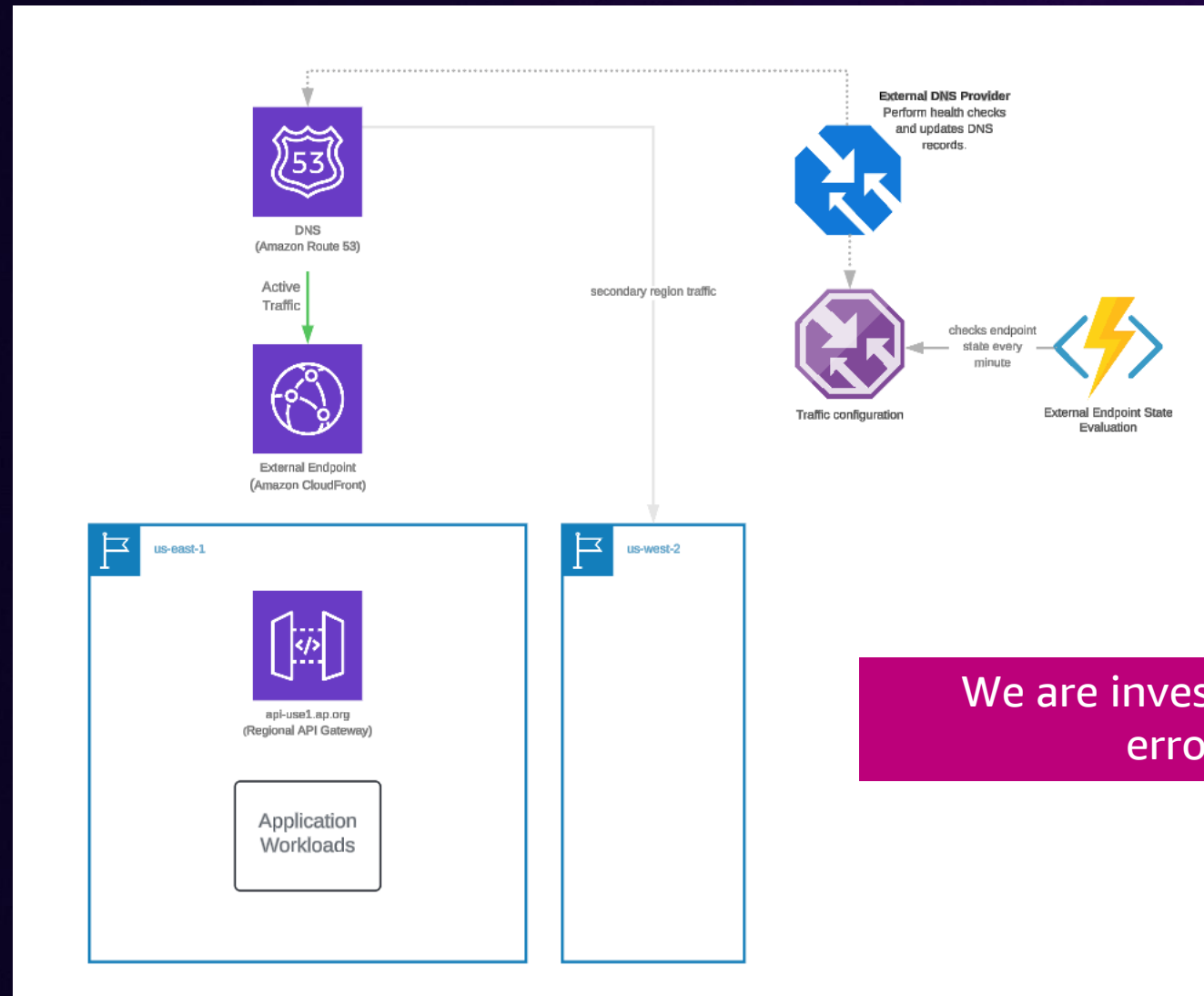
Pattern: Is my region healthy?



Summarize health for abstraction and speed



Pattern: Remove control plane dependencies



We are investigating increased error rates . . .

Build resilience into your workloads on AWS



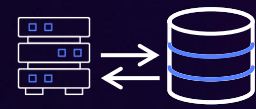
Categories of failure



Code deployments & configuration
e.g. bad deployment, cred expiration



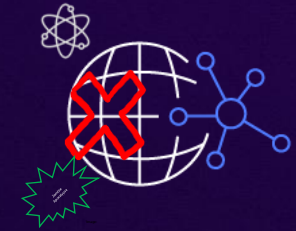
Core infrastructure
e.g. datacenter failure, host failure



Data and state
e.g. data corruption



Dependencies
e.g. infrastructure, external APIs



Highly unlikely scenarios
e.g. All of internet failure, environmental disasters,

Resilience mental model

Ability of a workload to recover from infrastructure or service disruptions

The mental model

High availability

Resistance to common failures through design and operational mechanisms at a **primary site**



Core services, design goals to meet availability goals

Disaster recovery

Returning to normal operation within specific targets at a **recovery site** for failures that cannot be handled by HA



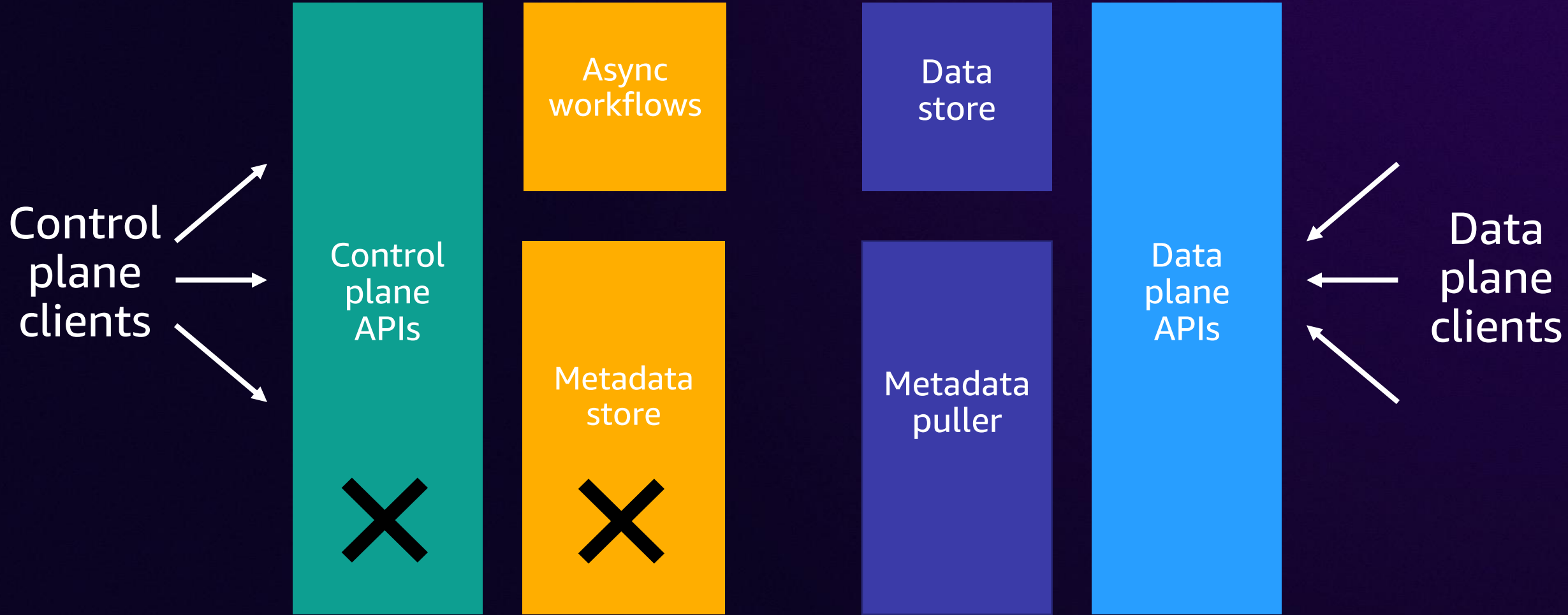
Backup & recovery, data bunkering, managed recovery objectives

Continuous improvement

← CI/CD, observability, moving beyond pre-deployment testing towards chaos engineering patterns →

Control plane and data plane

MODULAR SEPARATION CREATES STATIC STABILITY

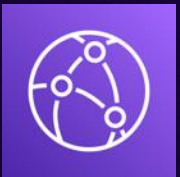


Avoid control plane operations for recovery strategies



AWS IAM Identity Center

What will work	What may not work
IAM Policies will continue to be evaluated	CRUDL IAM policies



Amazon CloudFront

What will work	What may not work
Will continue to cache and serve content	CRUDL CloudFront distributions



Amazon Route 53

DNS resolution and health checks	Updates to routing policies
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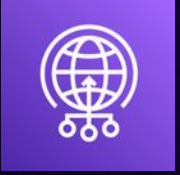
AWS Organizations

Service Control Policies (SCP)	View or update organization structure
--------------------------------	---------------------------------------



Amazon Application recovery controller

Changes to routing controls	CRUDL routing controls
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AWS Global Accelerator

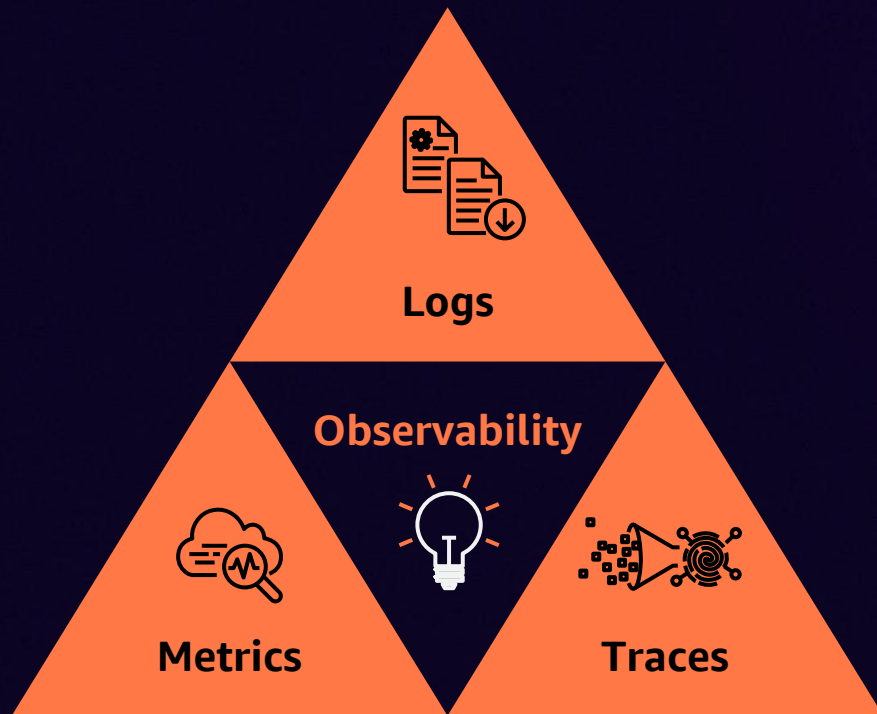
Edge routing will continue to function	Add/Modify endpoints
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Global services

Monitor the health of your applications

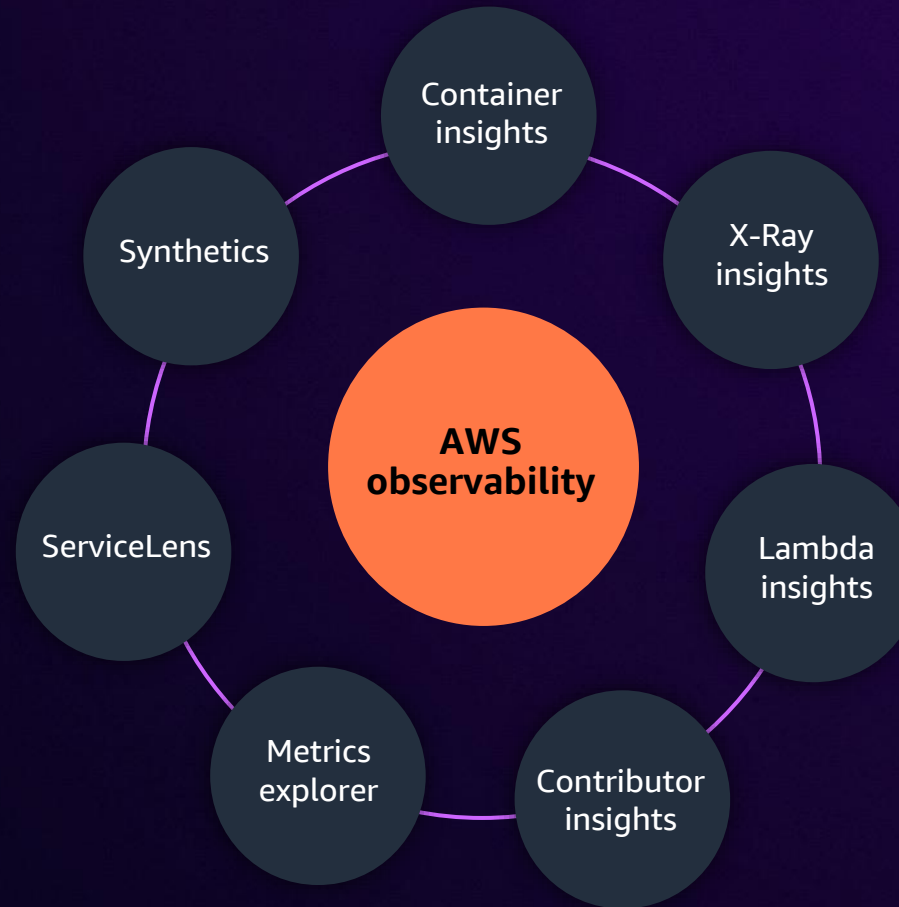
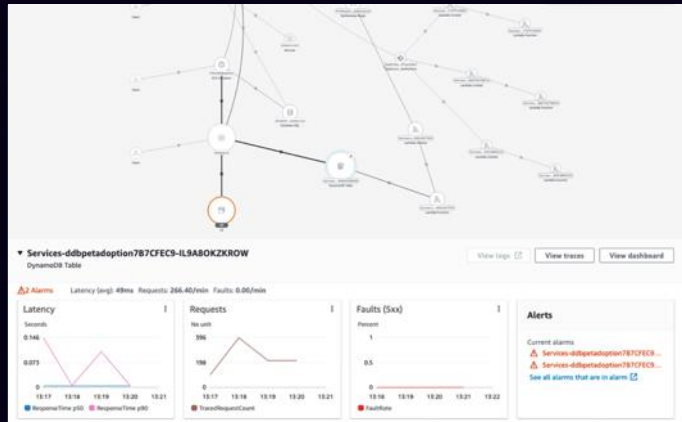
THREE PILLARS OF OBSERVABILITY TOOLING



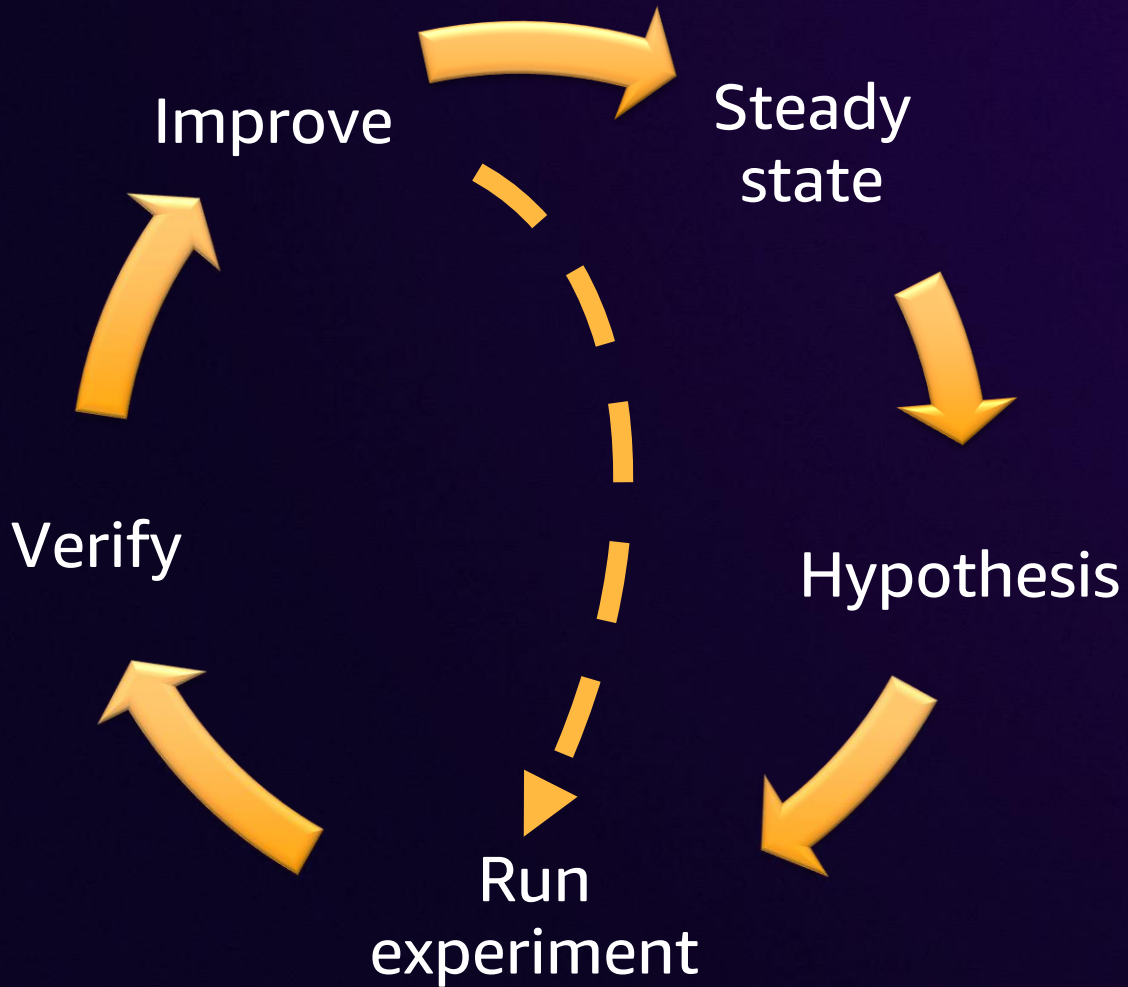
- Metrics:
 - Numeric data
 - Measured at various time intervals
 - Such as SLIs
- Logs:
 - Timestamped records of discrete events
- Traces:
 - User's journey across multiple applications & systems

AWS observability tools

- Infrastructure monitoring
- Application monitoring
- Synthetic monitoring



Chaos engineering

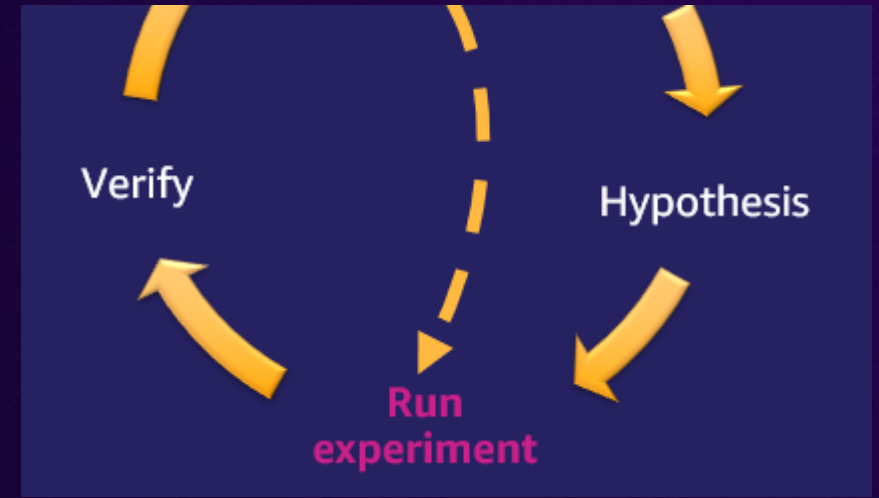


Chaos experiment

Inject **events** that simulate

- **Hardware failures**, such as servers dying
- **Software failures**, such as malformed responses
- Nonfailure events, such as spikes in traffic or **scaling** events

Any event capable of disrupting steady state



Resources to learn about Architectural best practices for Resilience



Static stability



CI/CD



Workload
segmentation



Graceful
degradation



Dashboard for
operations
visibility

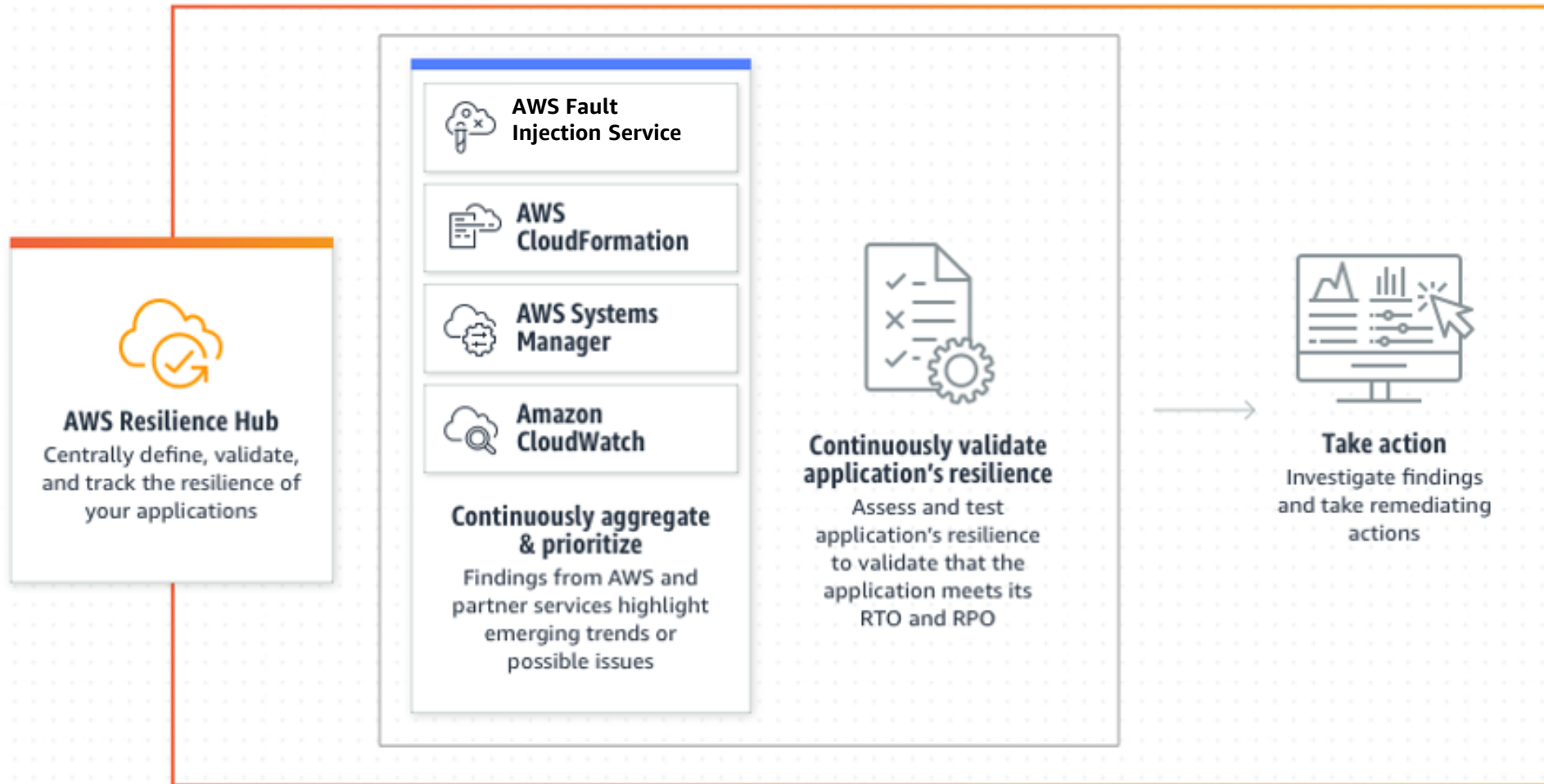


Chaos
engineering

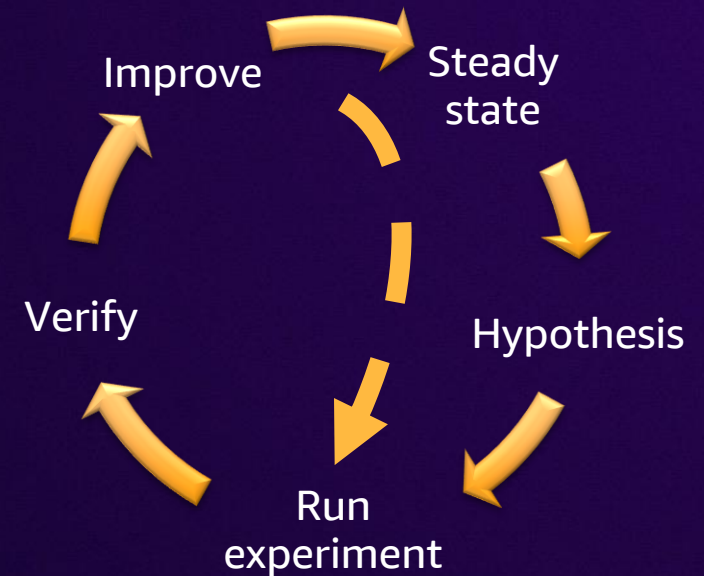
AWS Services to help build resilience



AWS Resilience Hub



AWS Fault Injection Service

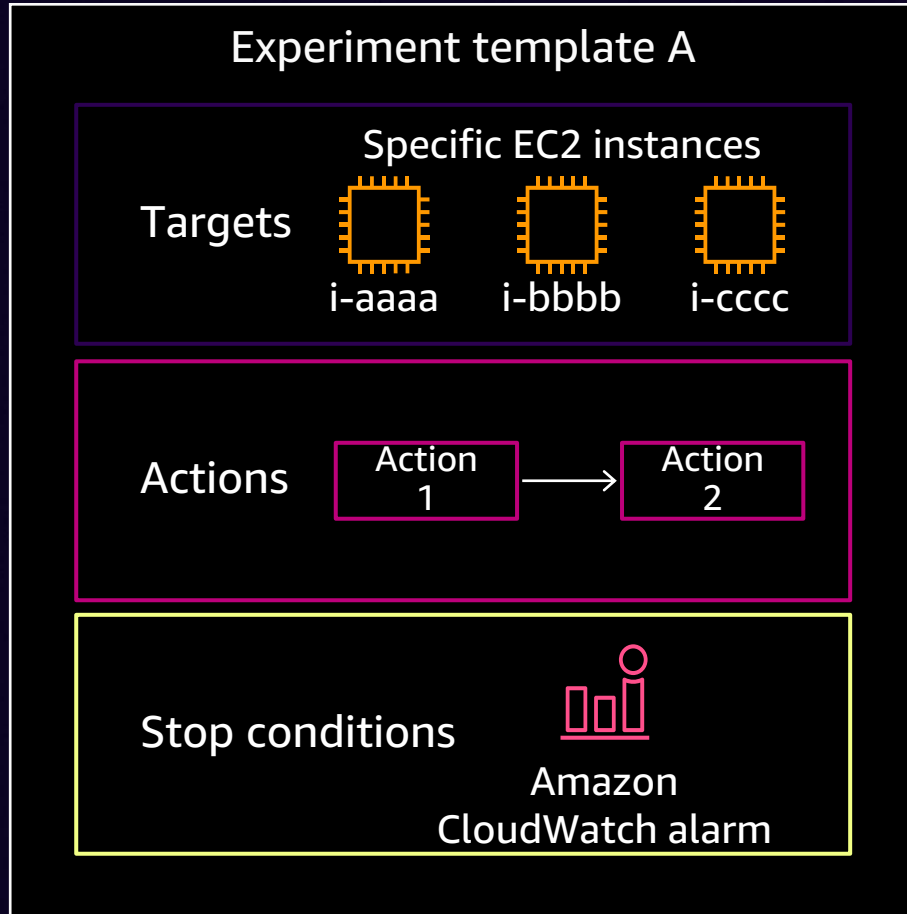


Improve application performance and resiliency

Safely run chaos experiments with fine-grained controls

Test complex, real-world failure scenarios

AWS Fault Injection Service



FIS Supported Actions:

[Fault injection actions](#)

[Wait action](#)

[Amazon CloudWatch actions](#)

[Amazon DynamoDB actions](#)

[Amazon EBS actions](#)

[Amazon EC2 actions](#)

[Amazon ECS actions](#)

[Amazon EKS actions](#)

[Amazon ElastiCache actions](#)

[Network actions](#)

[Amazon RDS actions](#)

[Amazon S3 actions](#)

[Systems Manager actions](#)

[Use Systems Manager SSM documents with AWS FIS](#)

[Use the AWS FIS aws:ecs:task actions](#)

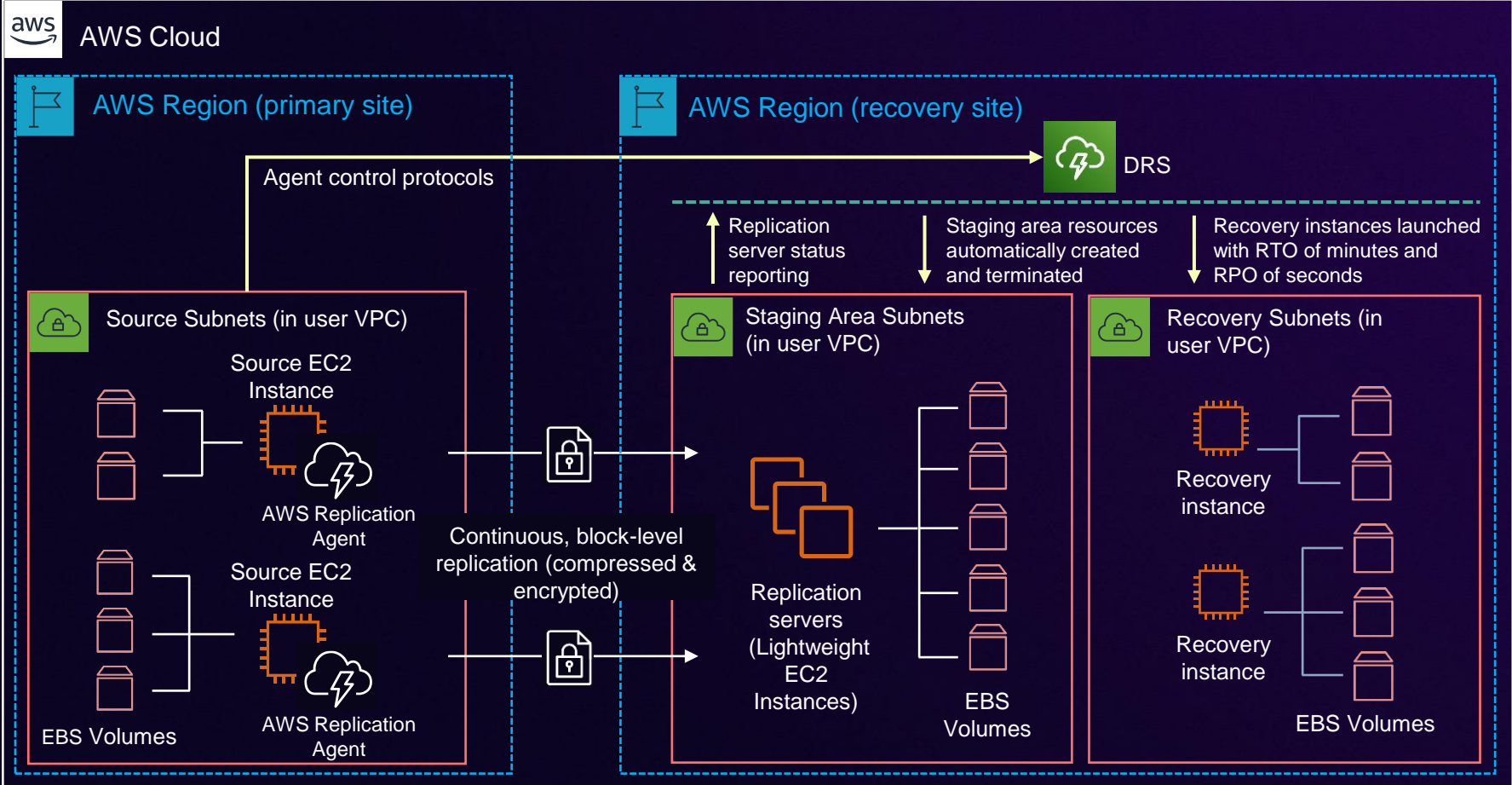
[Use the AWS FIS aws:eks:pod actions](#)

Amazon Application Recovery Controller



Centralized, safe and reliable way to manage cross-Region, cross-zone or cross-cell recovery.

AWS Elastic Disaster Recovery



Achieve resilience with AWS

- AWS Auto Scaling
- Amazon ELB
- Amazon DynamoDB (global tables)
- Amazon Aurora (Multi-AZ/Region)
- Amazon CloudFront
- AWS Shield
- AWS WAF
- Amazon S3 (Multi-Region Access Points)

- Amazon CodeGuru
- AWS CodePipeline
- AWS CodeBuild
- AWS CodeDeploy
- AWS CodeStar
- Amazon CodeWhisperer
- Amazon CodeCatalyst
- Amazon DevOps Guru
- AWS X-Ray

- AWS Fault Injection Service
- AWS Managed Services (AMS)



- Amazon Route 53 ARC
- Amazon EFS (replication)
- Amazon S3 (CRR)
- Amazon S3 (Versioning)

- AWS Resilience Hub
- AWS Trusted Advisor
- AWS Well-Architected Tool
- AWS CloudTrail
- Amazon EventBridge
- Amazon CloudWatch
- AWS Step Functions
- Amazon Managed Grafana
- Amazon Managed Services for Prometheus
- AWS Health Dashboard

- AWS Backup
- AWS Elastic Disaster Recovery
- Amazon EBS (snapshots)
- AWS DataSync

- AWS Systems Manager
- Auto playbook
- OpsCenter



Challenges are specific, but not novel

Associated Press (AP) Media Supply Chain Known patterns

Consider latency when performing data replication

Cross-region Amazon S3 replication

Monitor all systems and region health

Deep health checks & observability/instrumentation

Control plane independence for failover

Static stability

Continuously test systems for failure

Chaos engineering

Key takeaways



App modernization
innovation curve
accelerates beyond
lift and shift



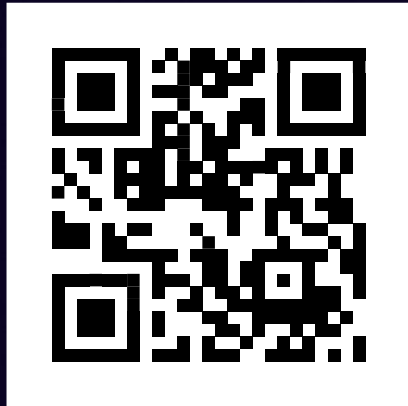
Multi-region for
resilience requires careful
evaluation



Aggressively pursue
simplicity (multi-region
is hard enough)

Next steps

Read the latest headlines, breaking news, and videos at APNews.com



Learn more about how **nonprofits** are using AWS in sessions at AWS re:Invent 2024:

1. **IMP212**

Harnessing AWS for natural disaster early warning at scale

Wed, 5:30 PM
MGM - Chairmans 370

2. **IMP210**

Unleashing compassion: AWS for child protection & data governance

Thu, 4:00 PM
VEN - Lido 3002

Want more?
Session recommendations
for nonprofits →



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Thank you!

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Akshay Saxena
saxaksha@amazon.com

Dominic Delmolino
ddelmoli@amazon.com



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