AWS re:Invent

ARC317-R

Building global applications that align to BC/DR objectives

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Amazon Web Services

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Solutions Architect
Amazon Web Services

AWS re:Invent

aws

Agenda

Business continuity (BC) & disaster recovery (DR)

Observability

Multi-region architecture

- Data replication
- Traffic management

Hands-on labs

Related breakouts

ARC213-R, -R1 – Architecture patterns for multi-region active-active

ARC309-R1 – Hands-on: Building a multi-region active-active solution

ARC406-R1, -R2 – Building multi-region microservices

ARC335-R1 – Designing for failure: Architecting resilient systems on AWS

STG346-R1 – Deep dive on CloudEndure Disaster Recovery

SVS337-R1 – Best practices for building multi-region, active-active serverless applications

Business continuity (BC) & disaster recovery (DR)

Maintain availability of critical systems as defined by business requirements.

Business continuity is not just about the technology, but also about people and processes.

Business requirements

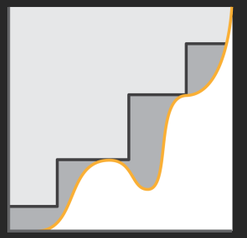
Key performance indicators (KPIs) defined by stakeholders

Disaster recovery

Recovery time objectives (RTO), recovery point objectives (RPO)

Observability

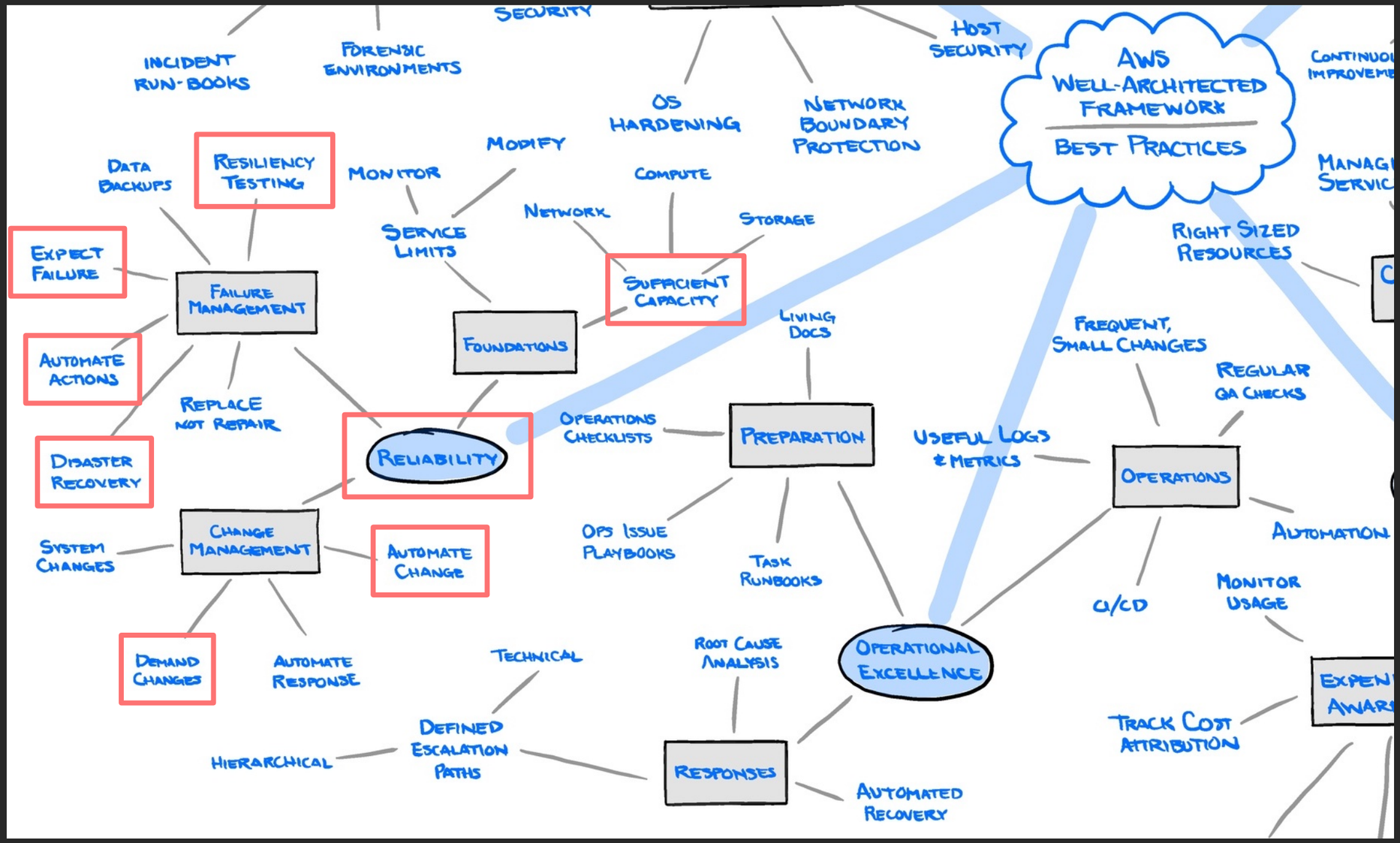
Monitoring, logging, distributed tracing, alerting



Automation

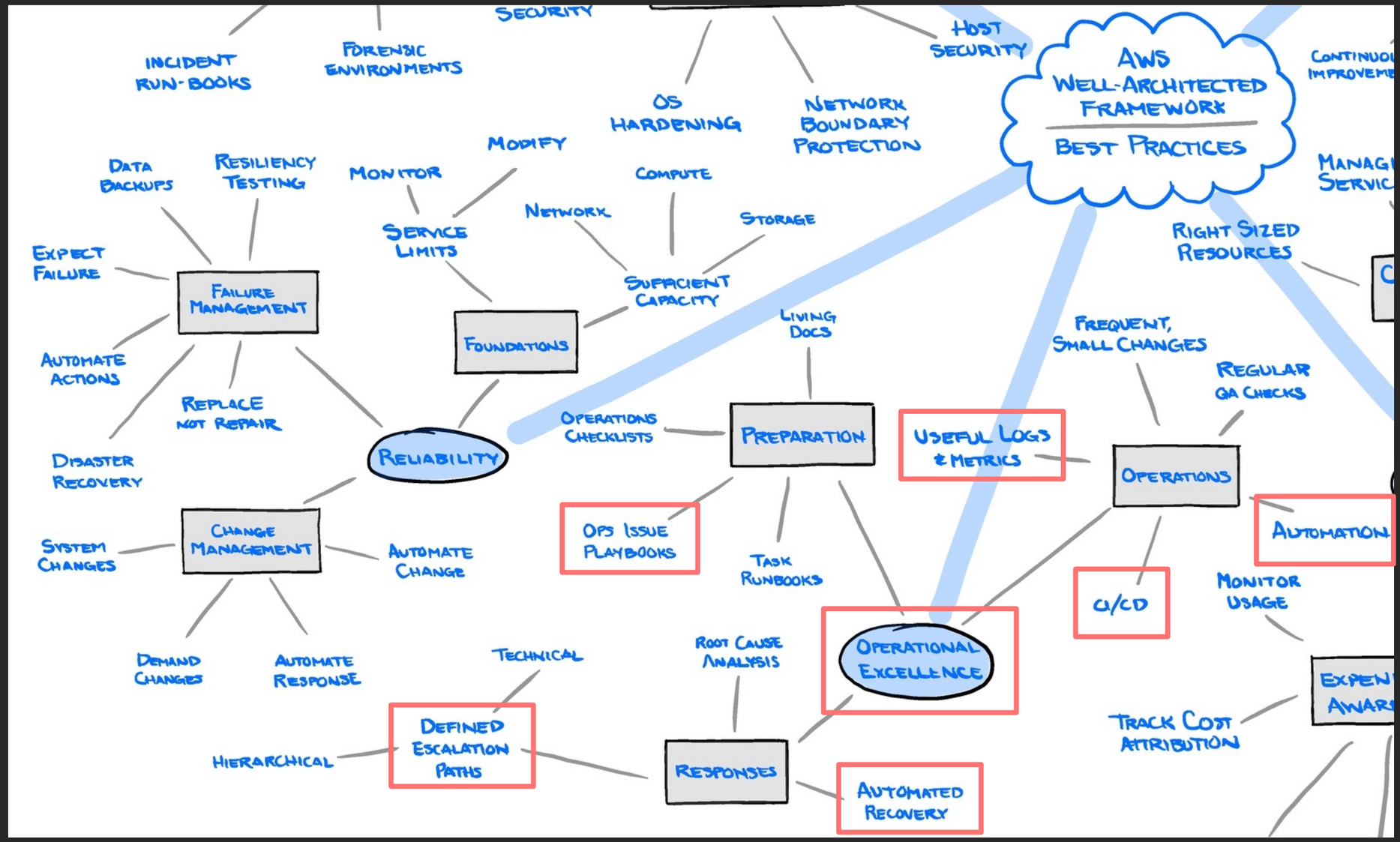
Scale based on demand and recover from failure(s)

Well-architected framework—Reliability



Source: https://www.awsgeek.com/posts/AWS-Well-Architected-Framework/index.html

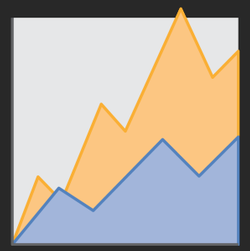
Well-architected framework—Operational excellence



Source: https://www.awsgeek.com/posts/AWS-Well-Architected-Framework/index.html

Observability

"…a measure of how well internal states of a system can be inferred from knowledge of its external outputs." – *Wikipedia*

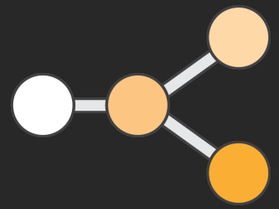


Monitoring

Collect, visualize, and analyze system or application metrics

Logging

Review events and errors generated by the system or application



Distributed tracing

Understand and analyze requests throughout the application architecture

Alerting and automation

Notify and/or automatically act on alarms and events

Observability—Tools and services

"…a measure of how well internal states of a system can be inferred from knowledge of its external outputs." – *Wikipedia*

Monitoring

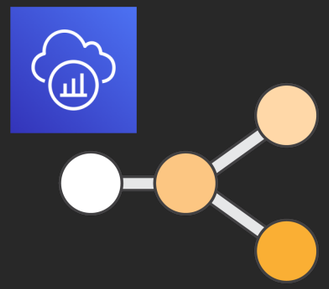
Amazon CloudWatch

Amazon CloudWatch Insights

Amazon Elasticsearch Service

Logging

Amazon CloudWatch Logs



Distributed tracing

AWS X-Ray

Alerting and automation

Amazon Simple Notification Service (Amazon SNS)

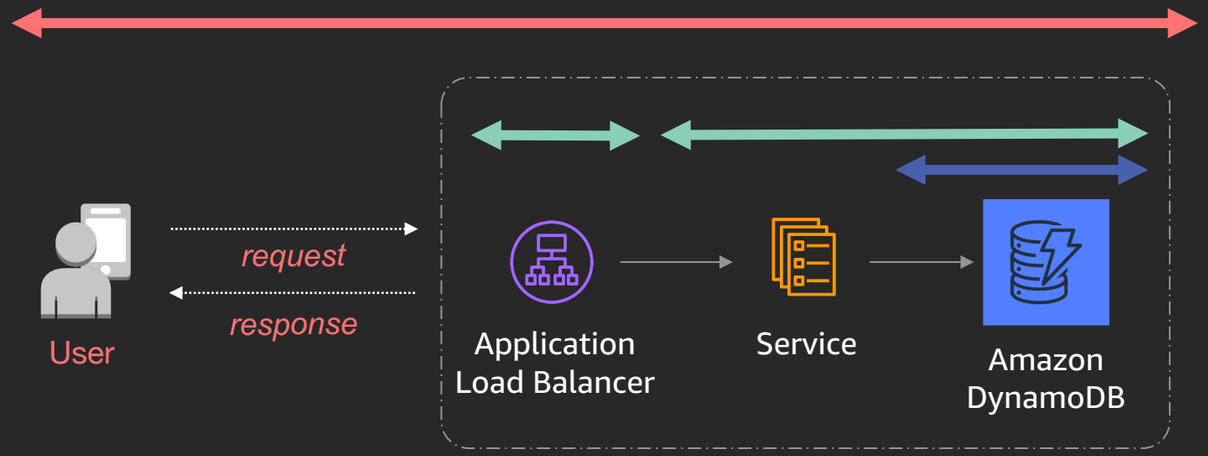
AWS Lambda

influxdata® Grafana Labs DATADOG New Relic® splunk>®

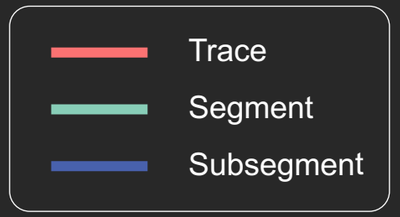
Distributed tracing

AWS X-Ray

- Analyze and debug distributed applications
- Useful for microservices environments
- X-Ray SDK for app instrumentation
- X-Ray daemon runs as sidecar




```
from aws_xray_sdk.core import xray_recorder
from aws_xray_sdk.ext.flask.middleware import XRayMiddleware
app = Flask(__name__)
xray_recorder.configure(service='Microservice')
XRayMiddleware(app, xray_recorder)
```



Multi-region architecture

Use cases:

- Business continuity/disaster recovery*
- Globally distributed customer base
- Latency-sensitive workloads
- Legal and data residency compliance (e.g., GDPR)

Challenges:

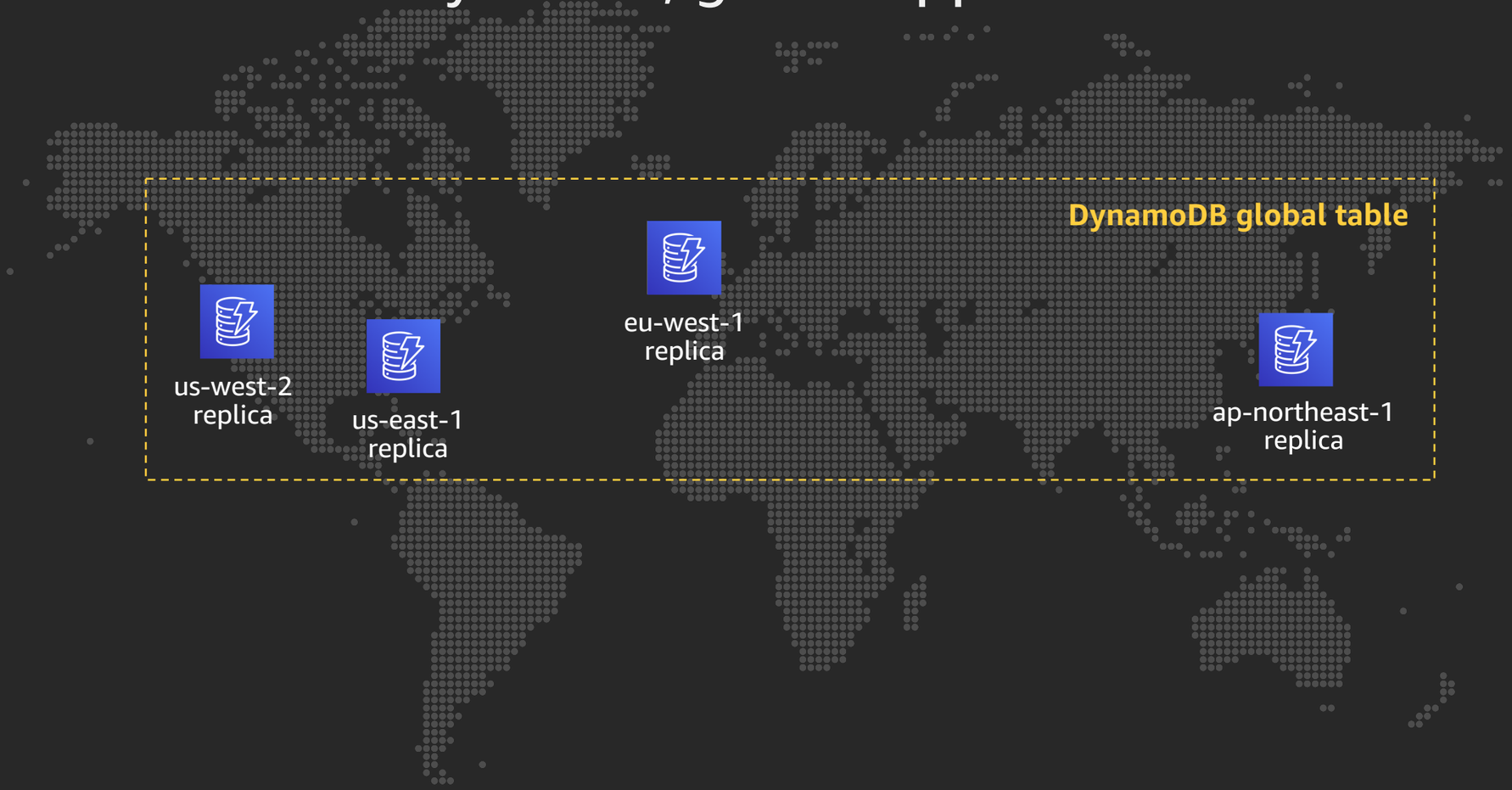
- Complexity—Data, deployments, governance, operations
- Cost—Resources, people

Source: https://xkcd.com/1739/

*Multi-region is not an absolute requirement for an effective DR strategy, but it addresses circumstances where regional geographic separation is required. It goes back to the requirements of the business.

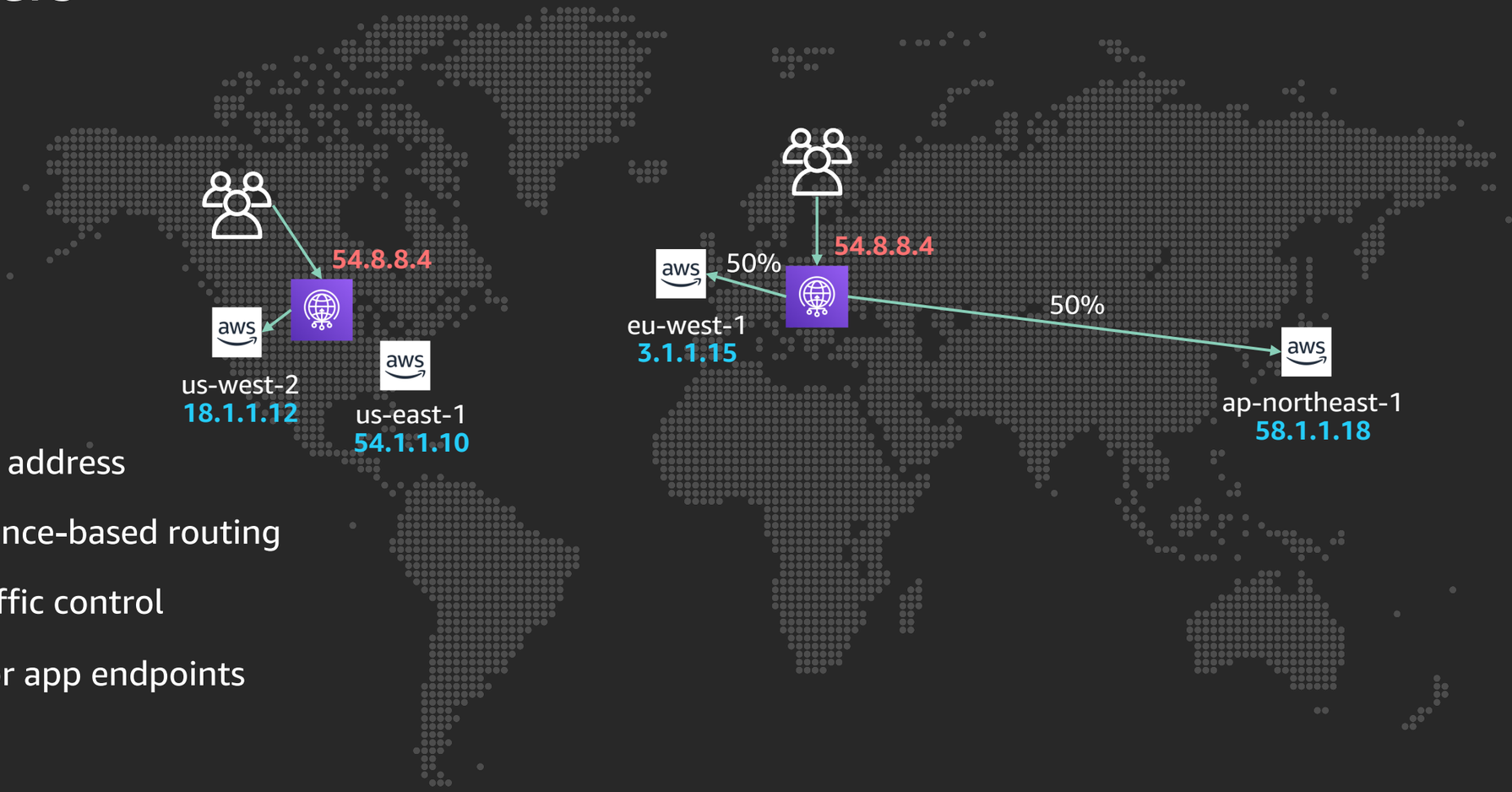
Multi-region architecture—Data replication

Amazon DynamoDB global tables—A fully managed, multi-region, and multi-master database that provides fast, local, read and write performance for massively scaled, global applications



Multi-region architecture—Traffic management

AWS Global Accelerator—A networking service that improves the availability and performance of the applications that you offer to your global users



Features:

Static anycast IP address

Global performance-based routing

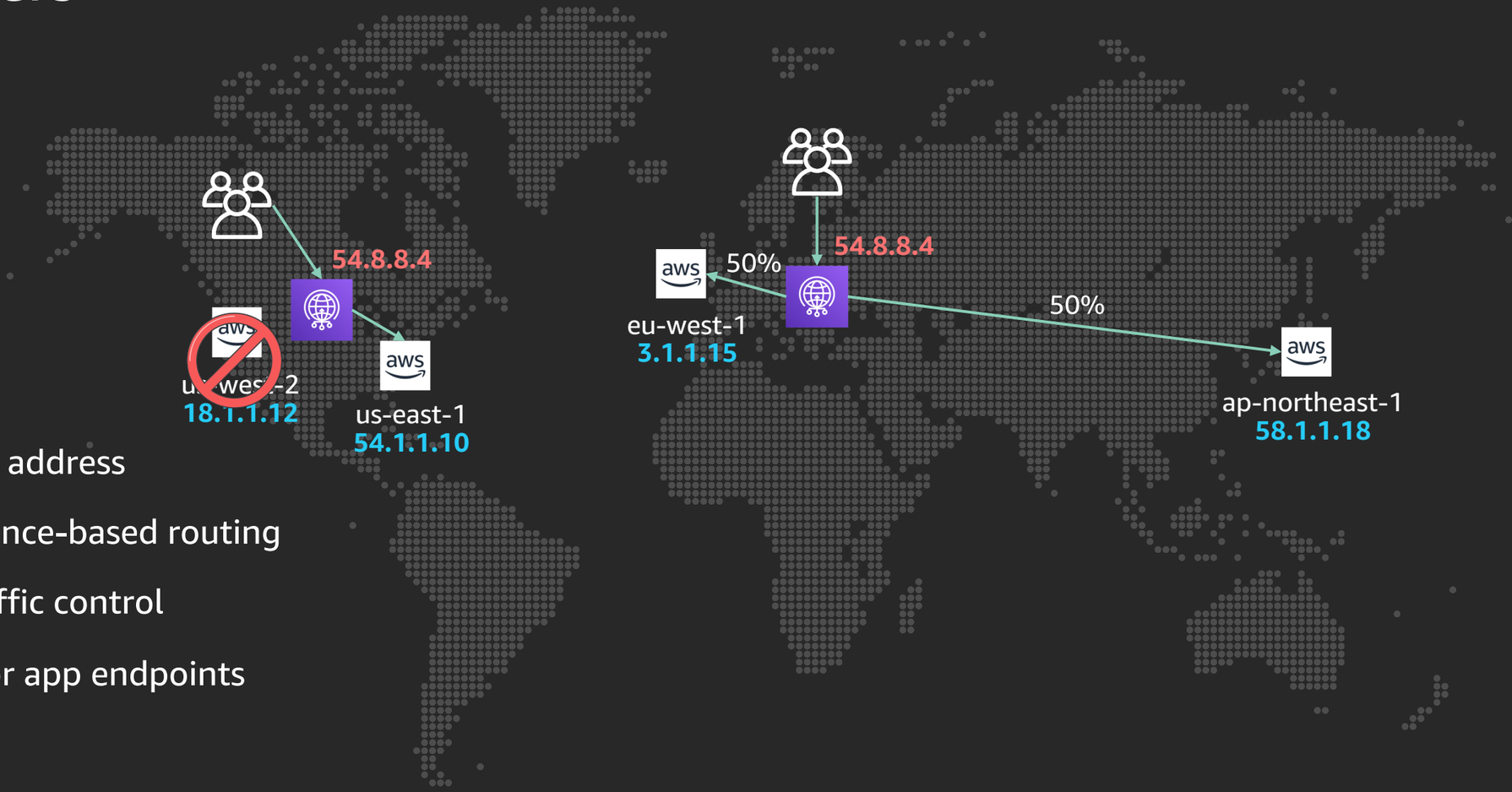
Fine-grained traffic control

Health checks for app endpoints

DDoS resiliency

Multi-region architecture—Traffic management

AWS Global Accelerator—A networking service that improves the availability and performance of the applications that you offer to your global users



Features:

Static anycast IP address

Global performance-based routing

Fine-grained traffic control

Health checks for app endpoints

DDoS resiliency

Multi-region architecture—Operational considerations

When to failover between regions?

- Application health
- Infrastructure health
- Downstream dependency health

What to failover?

- Application stack—Frontend, backend, data
- Microservices

How to prepare?

- Observability
- Automation everywhere—Auto scaling, infrastructure as code, CI/CD
- Testing—Unit, integration, failover/recovery
- Documentation—Runbooks, playbooks, notifications/escalations

AWS Well-Architected Tool

Operational excellence
Security
Reliability
Performance efficiency
Cost optimization

AWS Well-Architected Tool

Hands-on lab

Welcome to Mythical Mysfits

Our mission: Ethical, mythical creature care

Our priority: Find homes for the abandoned, and often misunderstood, mythical creatures in our community

Help us find their forever homes!

Your mission: As Mythical Mysfits grows as an organization, business continuity planning and disaster recovery has become a focus. Implement and test a multi-region architecture to help the organization grow into additional geographies while maintaining high availability and providing an optimal experience for our customers.

Lab 1: Distributed tracing with X-Ray

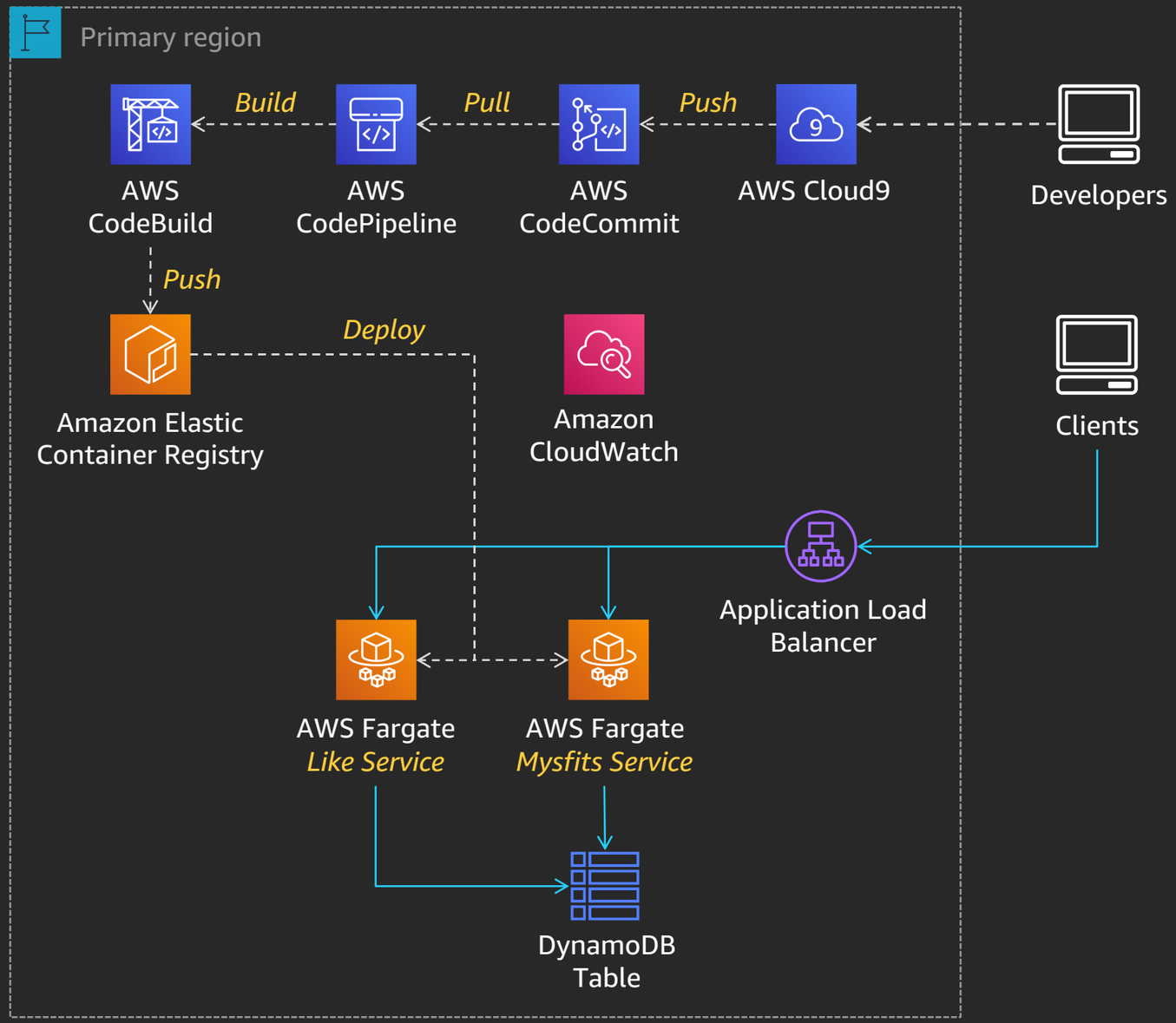
Lab 2: Operational dashboards to aggregate metrics in Amazon CloudWatch

Lab 3: Data replication to another AWS Region using Amazon DynamoDB global tables

Lab 4: Traffic management with AWS Global Accelerator

Lab 5: Load testing and failure injection

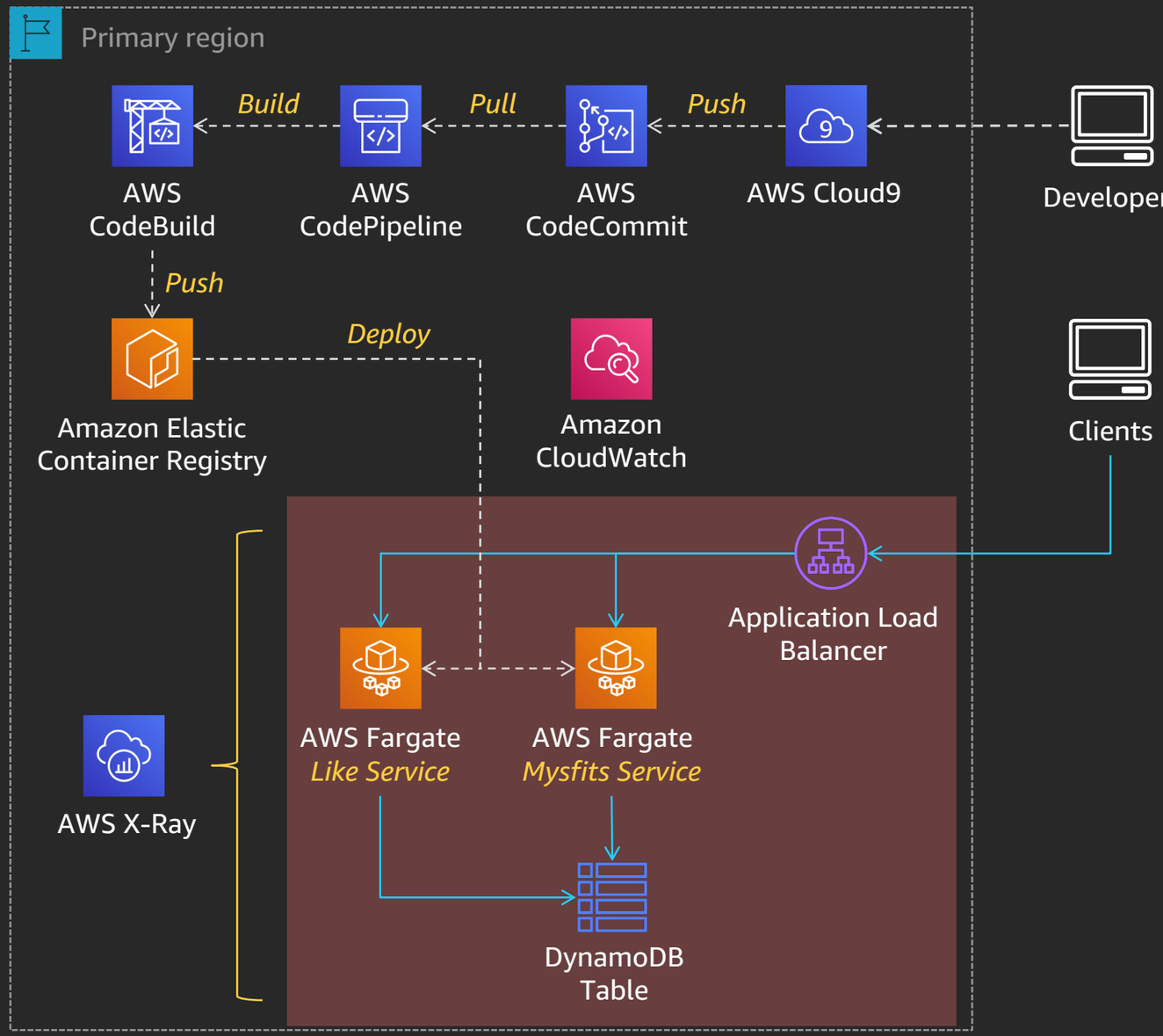
Mythical Mysfits architecture—Lab 0—Setup



Objectives:

1. Deploy base architecture with AWS CloudFormation
2. Run bootstrap script
3. Test web application

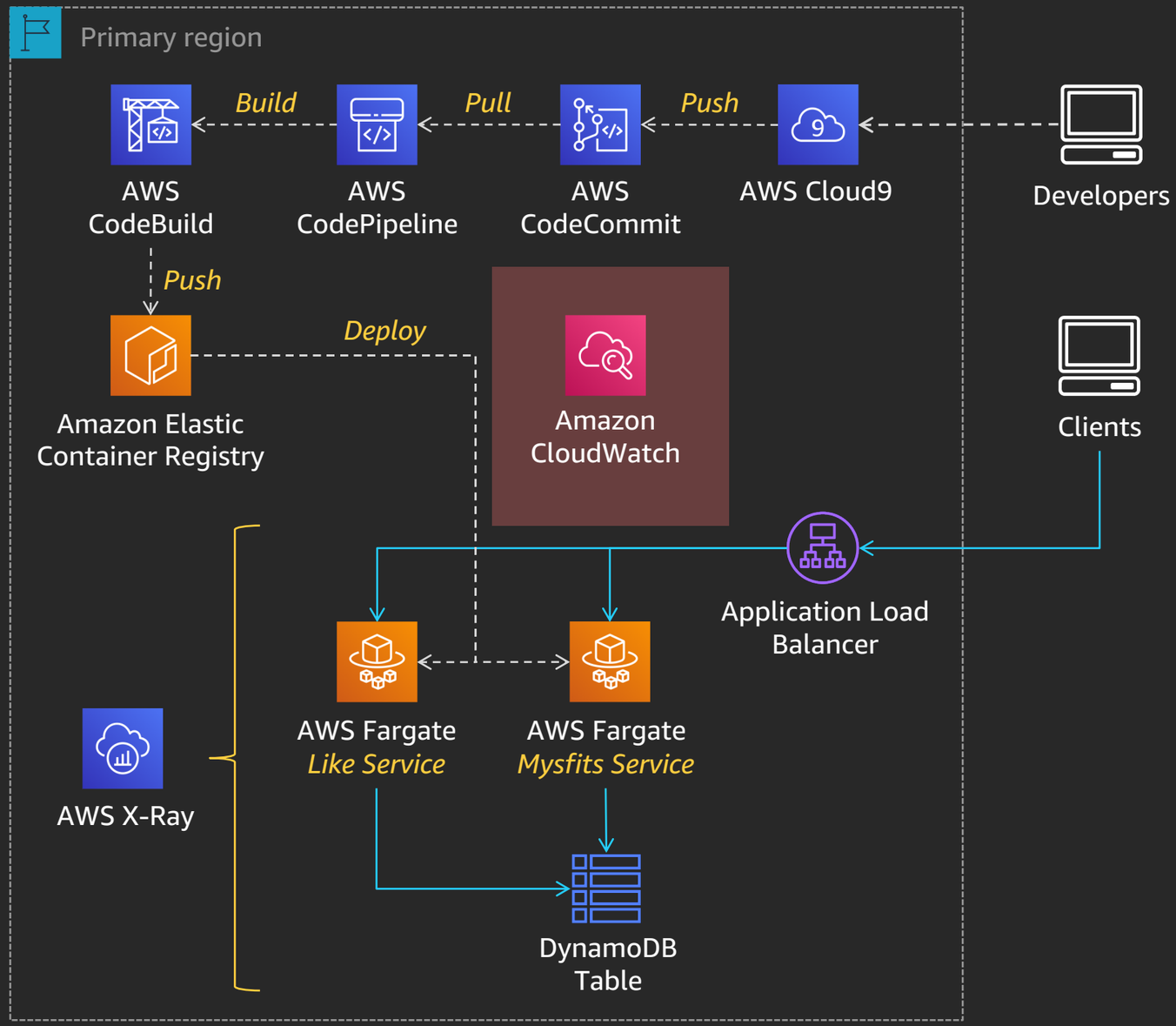
Mythical Mysfits architecture—Lab 1—Tracing



Objectives:

1. Instrument application with X-Ray to trace incoming requests and downstream calls
2. Review X-Ray service map and create X-Ray group to generate CloudWatch metrics
3. Review CloudWatch metrics

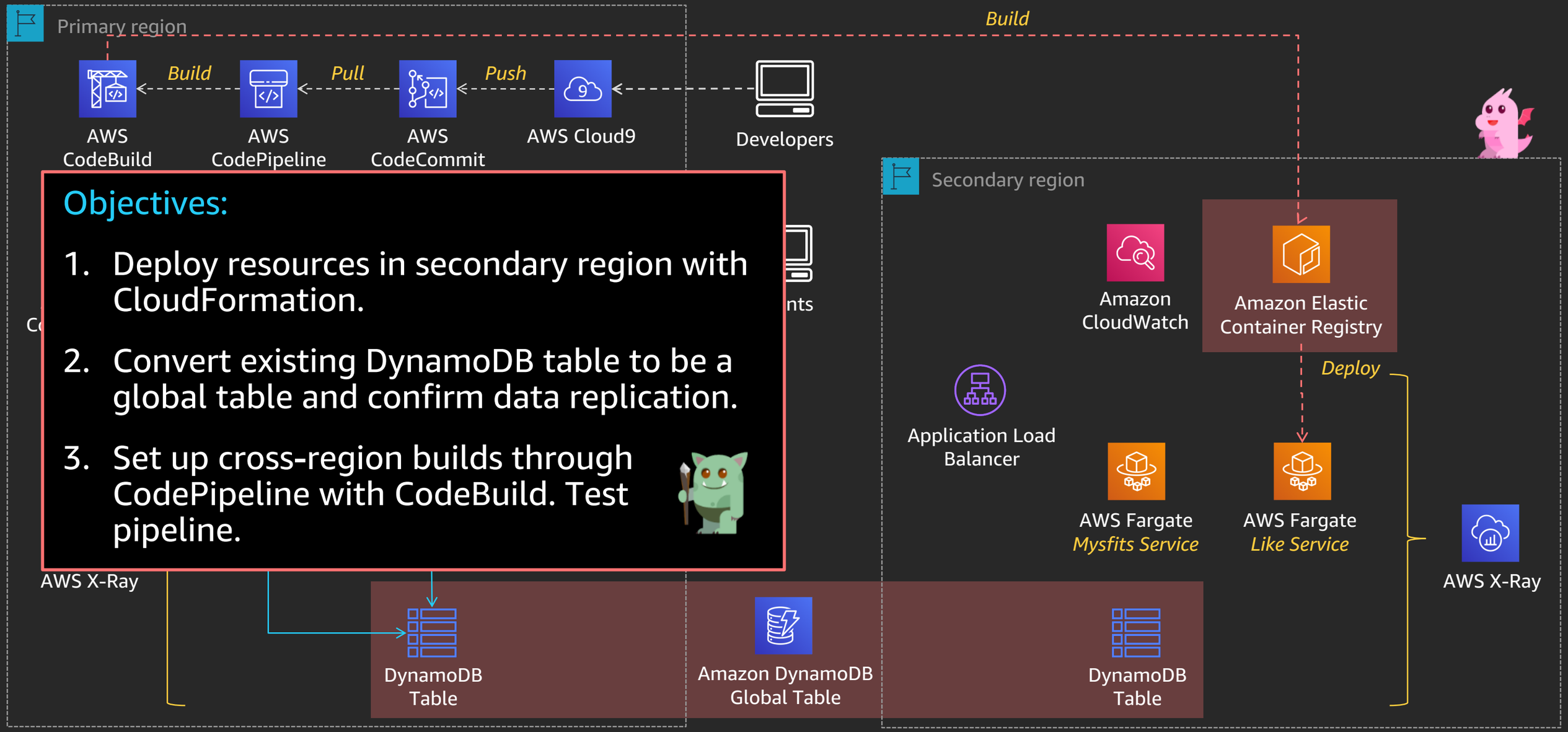
Mythical Mysfits architecture—Lab 2—Ops dashboard



Objectives:

1. Create an operational dashboard in CloudWatch that aggregates metrics to indicate health of the application

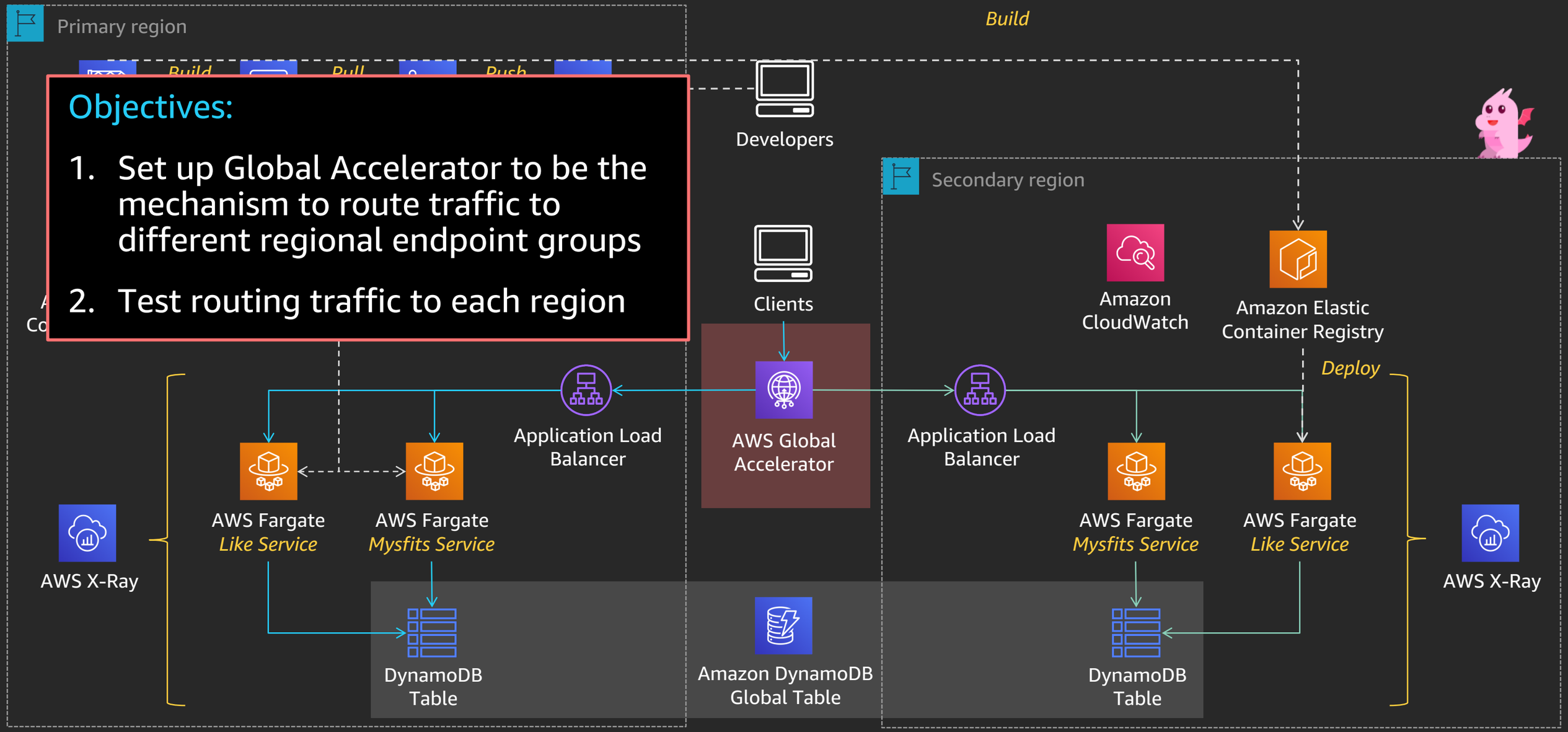
Mythical Mysfits architecture—Lab 3—Data + builds



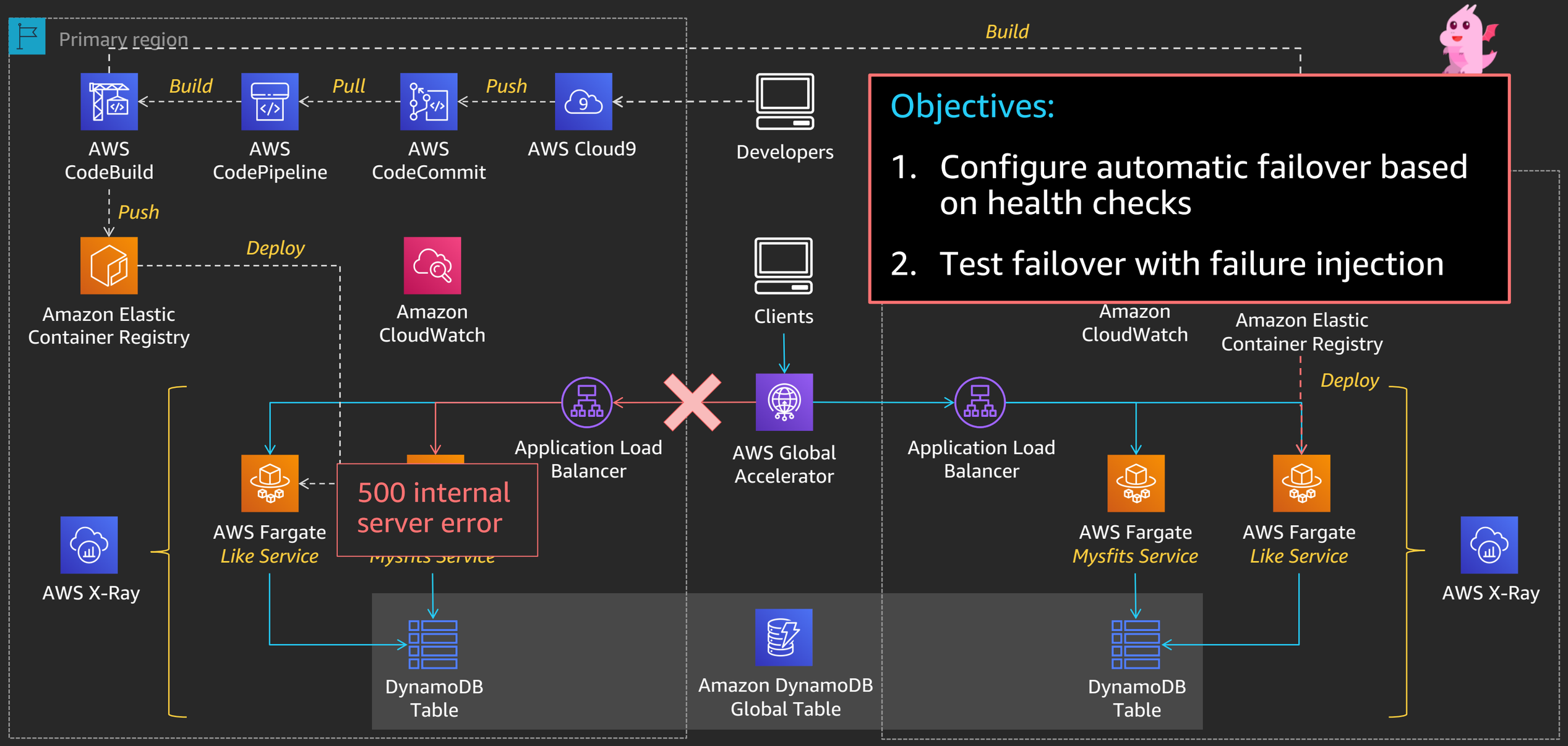
Objectives:

1. Deploy resources in secondary region with CloudFormation.
2. Convert existing DynamoDB table to be a global table and confirm data replication.
3. Set up cross-region builds through CodePipeline with CodeBuild. Test pipeline.

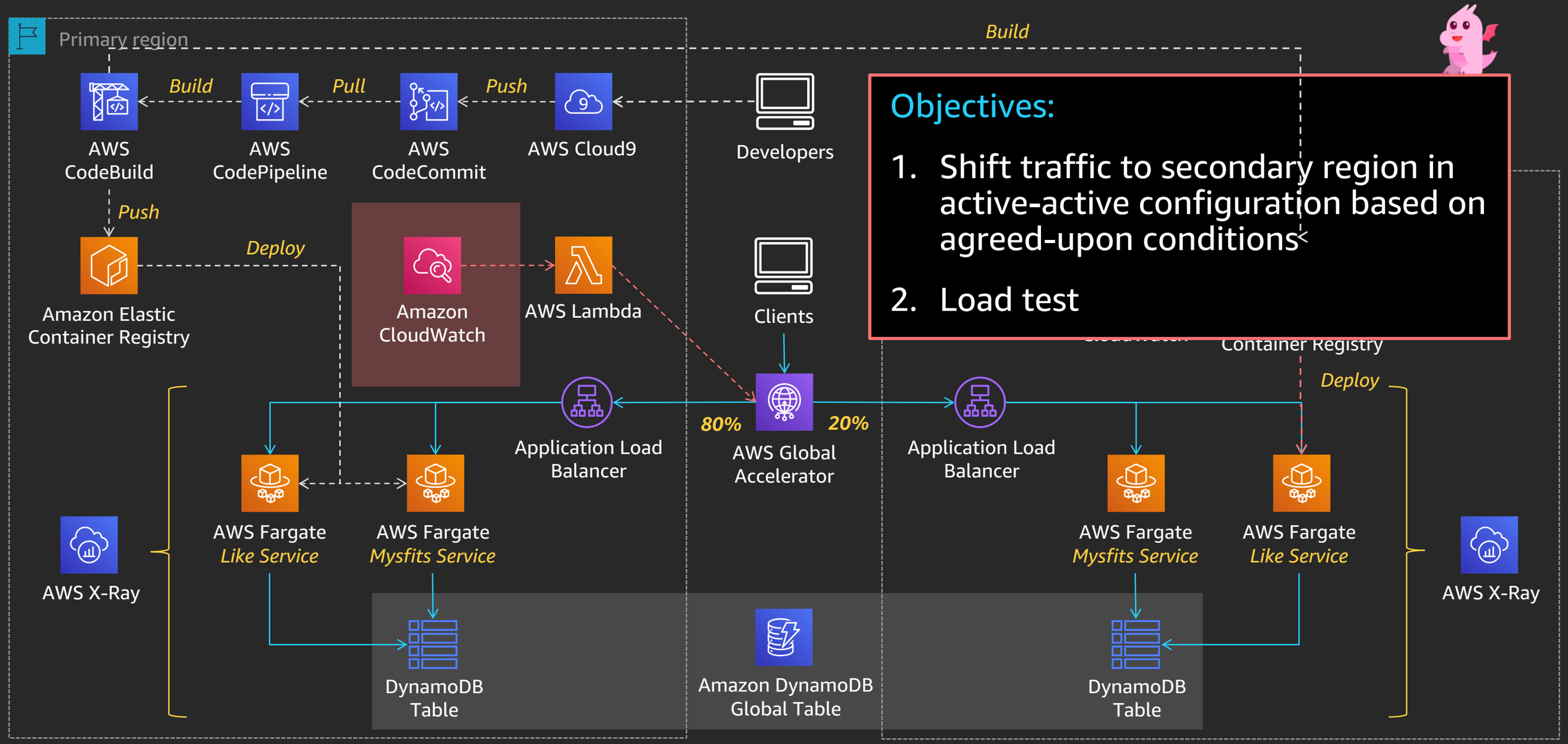
Mythical Mysfits architecture—Lab 4—Traffic routing



Mythical Mysfits architecture—Lab 5—DR testing



Mythical Mysfits architecture—Bonus—Active-active



Logistics



Instructions:

https://mythicalmysfits.com/multi-region-bcdr

Raise your hand if you have questions. Feel free to work together with folks at your table. High-five your neighbors, and have fun!

Please provide feedback through the mobile app and/or email us with questions/comments/feedback (include “*<AWS event> multi-region workshop*” in the subject or body)

aws-mythical-mysfits@amazon.com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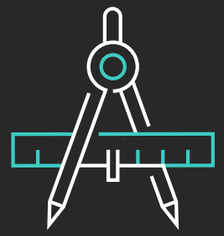

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