AWS re:Invent

ARC317-R

Building global applications that align to BC/DR objectives

Hubert Cheung
Solutions Architect
Amazon Web Services

Steve Challis
Solutions Architect
Amazon Web Services

AWS re:Invent

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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



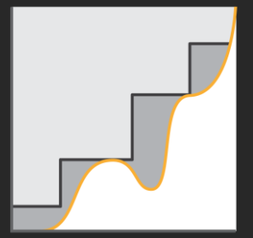
Disaster recovery

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



Observability

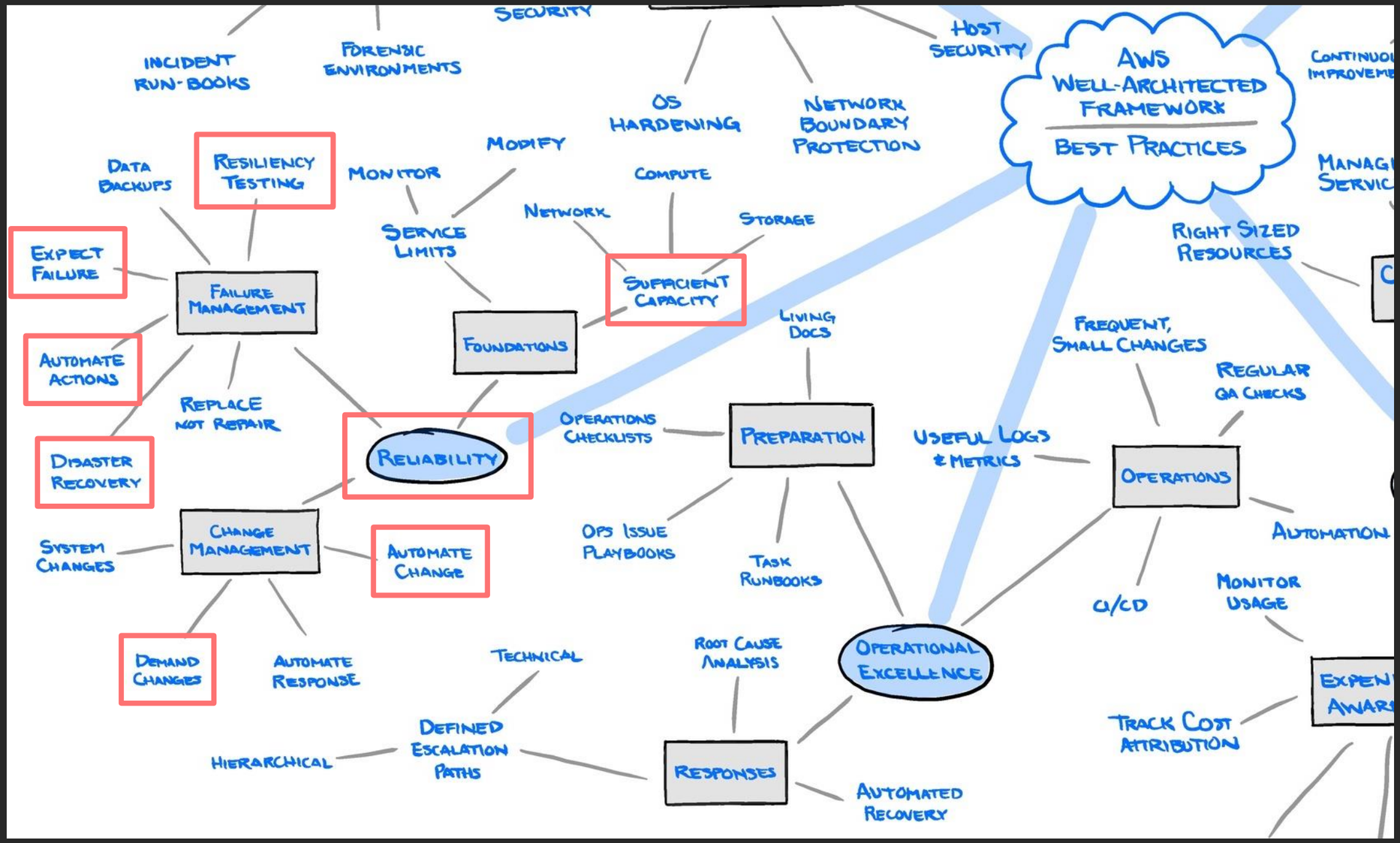
Monitoring, logging, distributed tracing, alerting



Automation

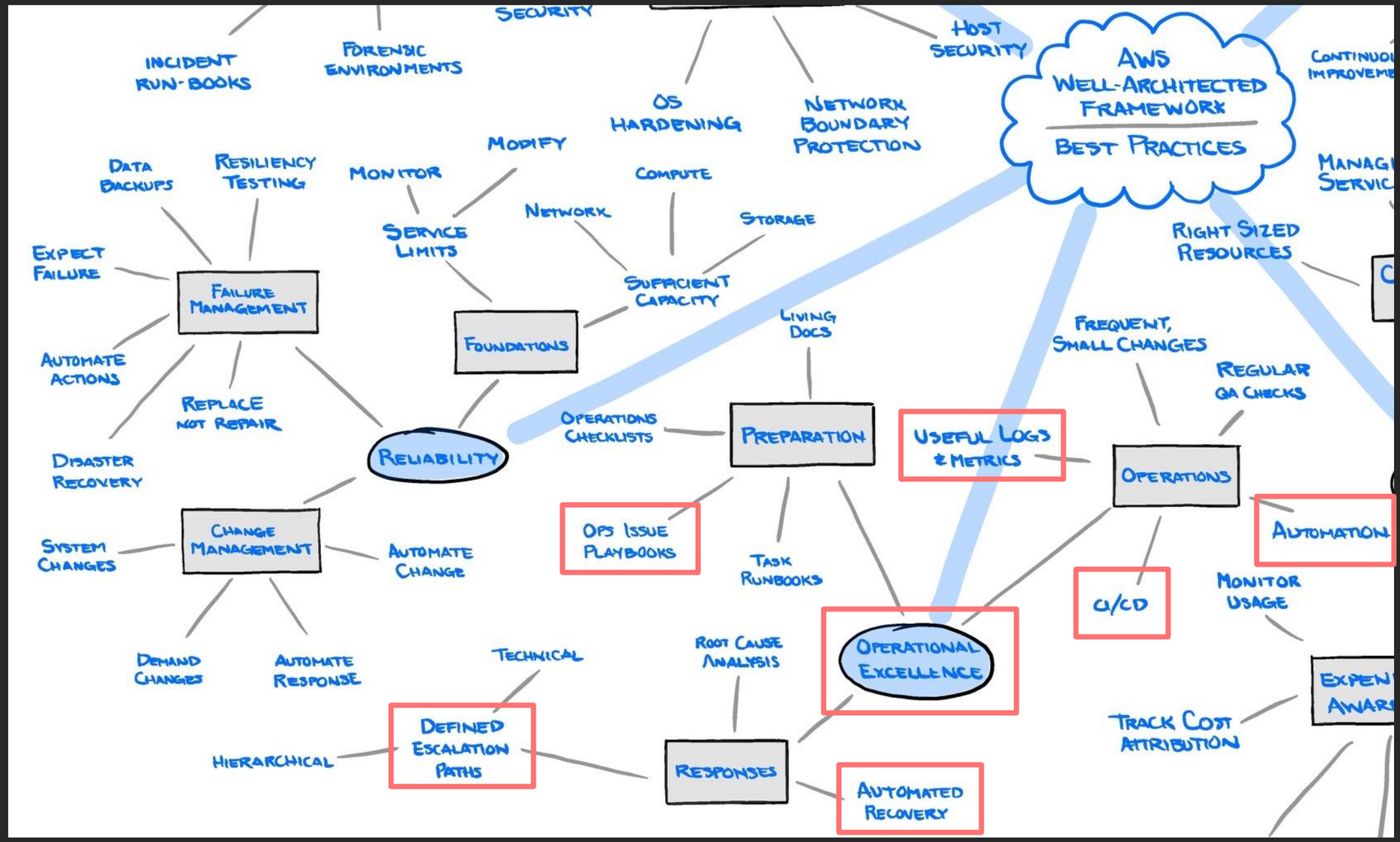
Scale based on demand and recover from failure(s)

Well-architected framework—Reliability



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

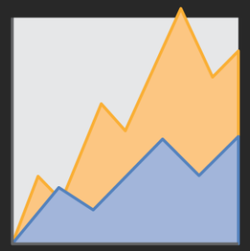
Well-architected framework—Operational excellence



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*



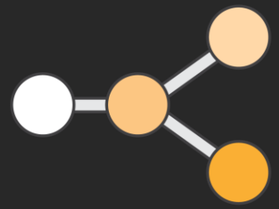
Monitoring

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

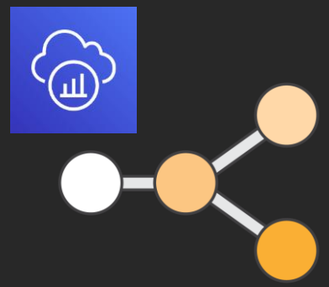
Amazon CloudWatch Insights

Amazon Elasticsearch Service



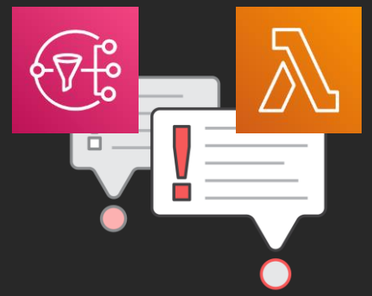
Logging

Amazon CloudWatch Logs



Distributed tracing

AWS X-Ray



Alerting and automation

Amazon Simple Notification Service (Amazon SNS)

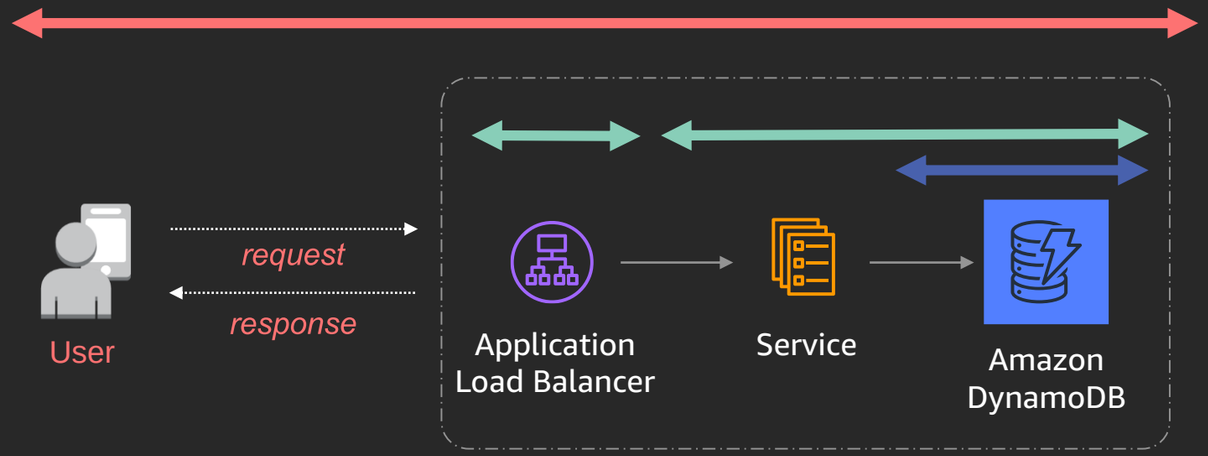
AWS Lambda

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

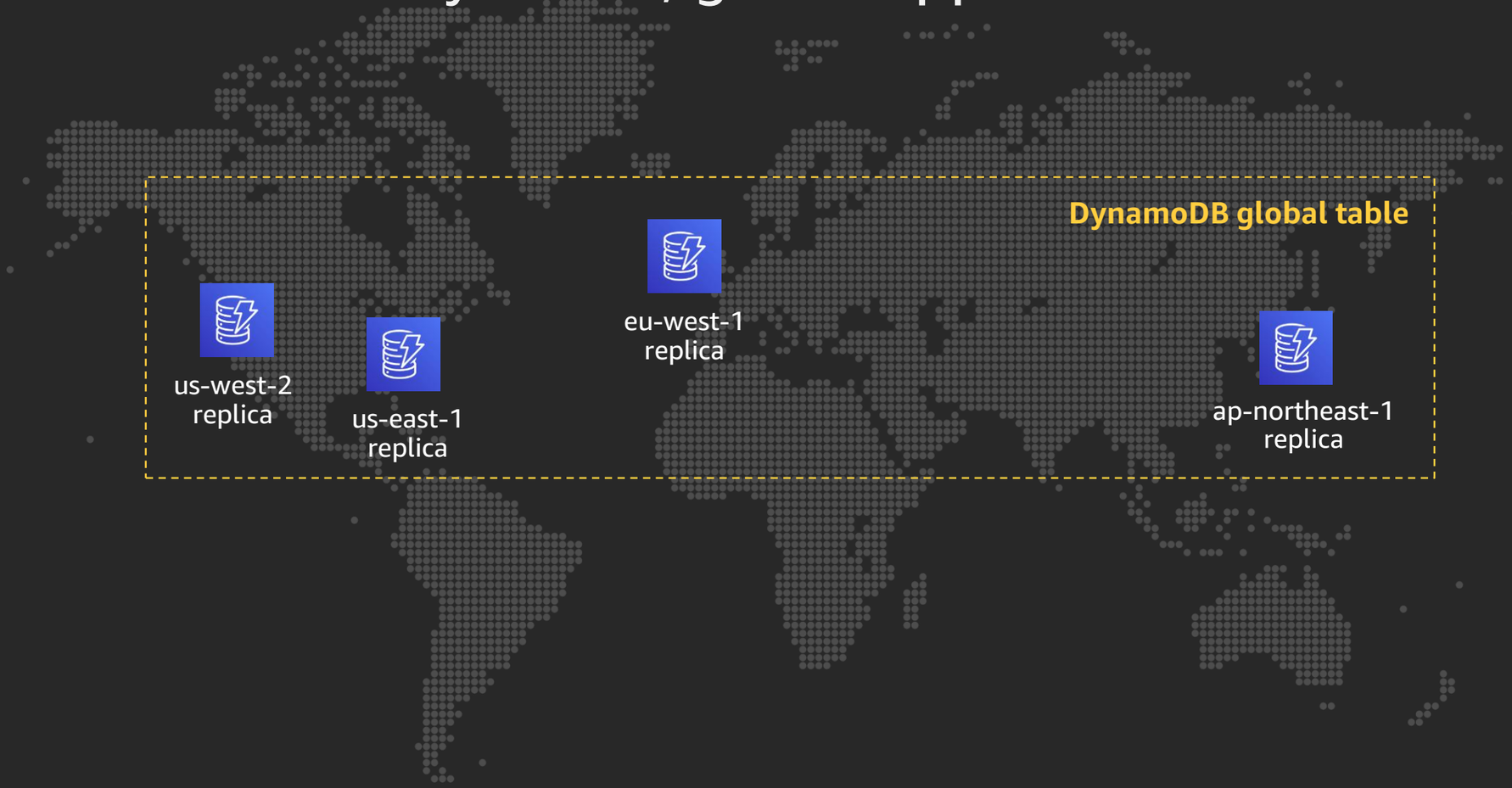


Source: https://xkcd.com/1739/

*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.

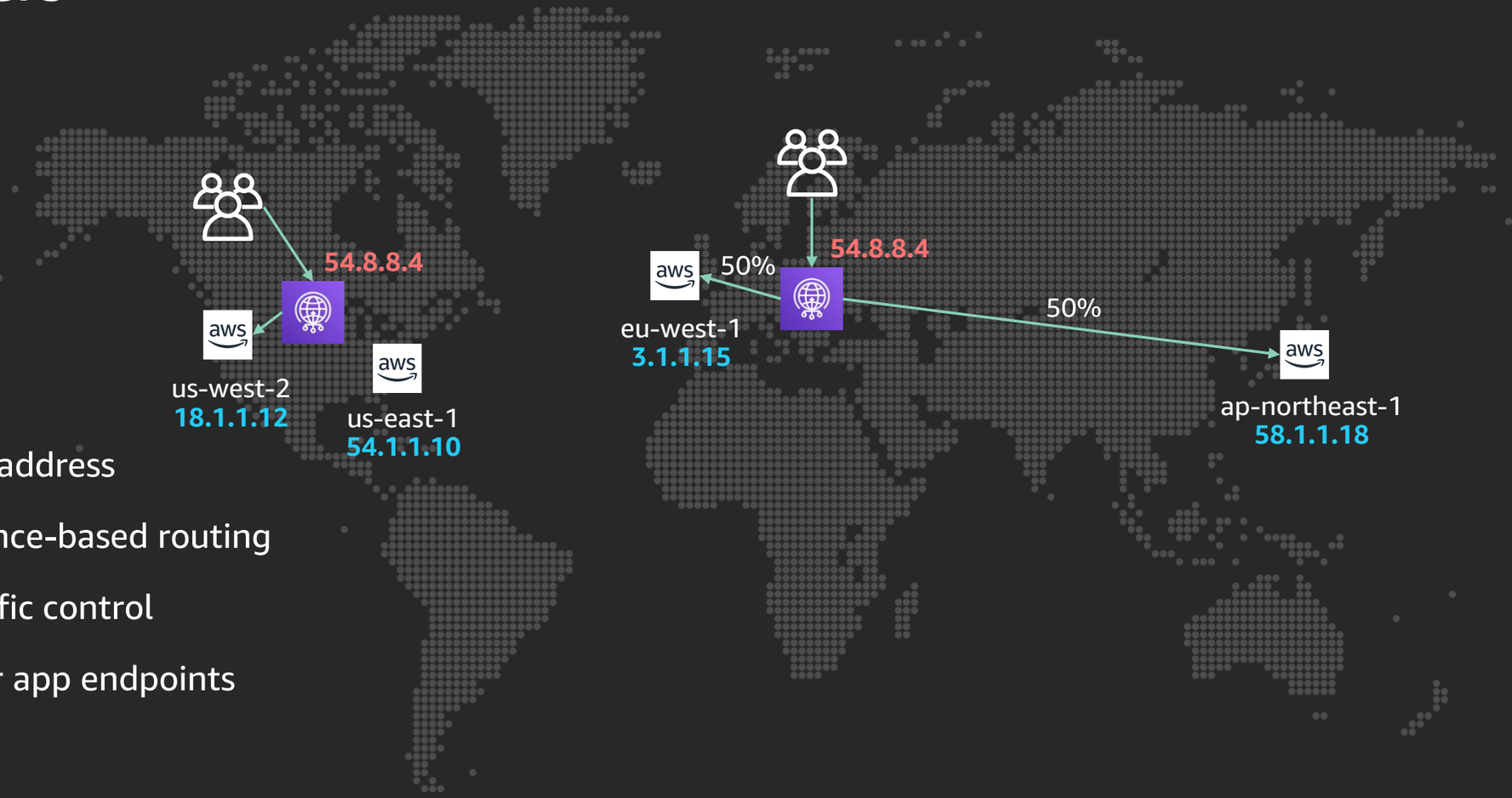
Multi-region architecture—Data replication

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

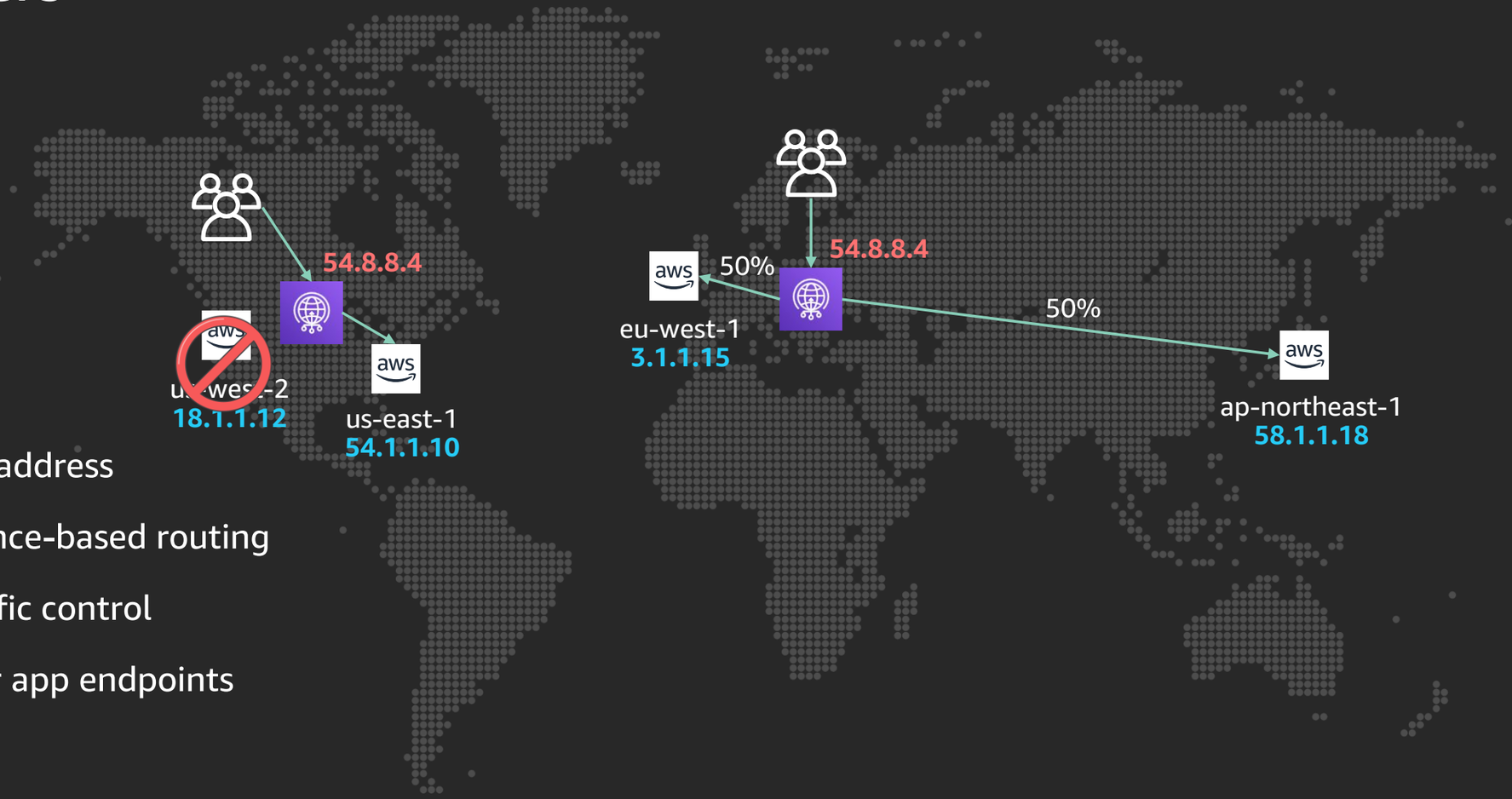
Fine-grained traffic control

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

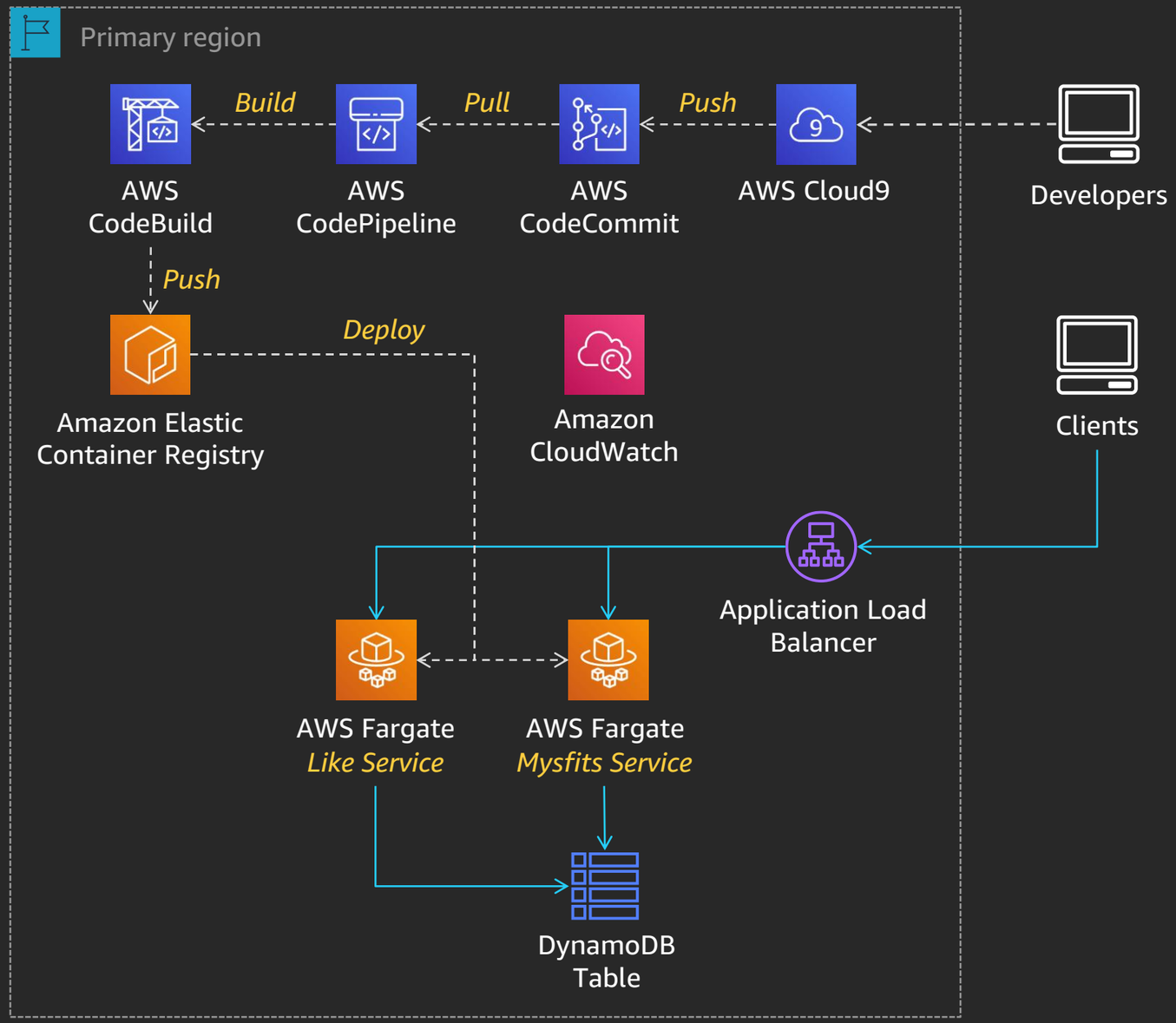
Lab 4: Traffic management with AWS Global Accelerator

Lab 5: Load testing and failure injection





Mythical Mysfits architecture—Lab 0—Setup

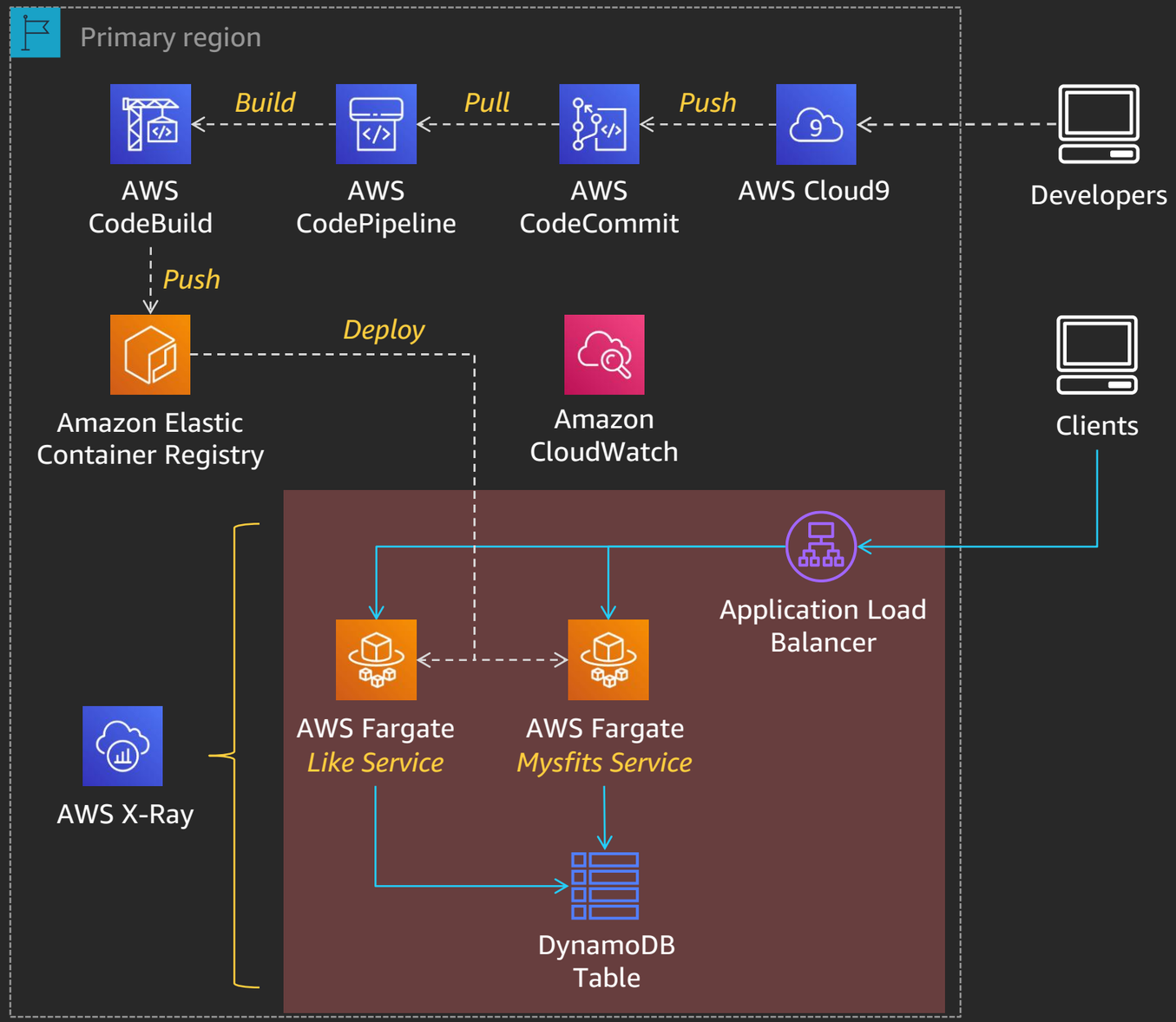


Objectives

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



Mythical Mysfits architecture—Lab 1—Tracing

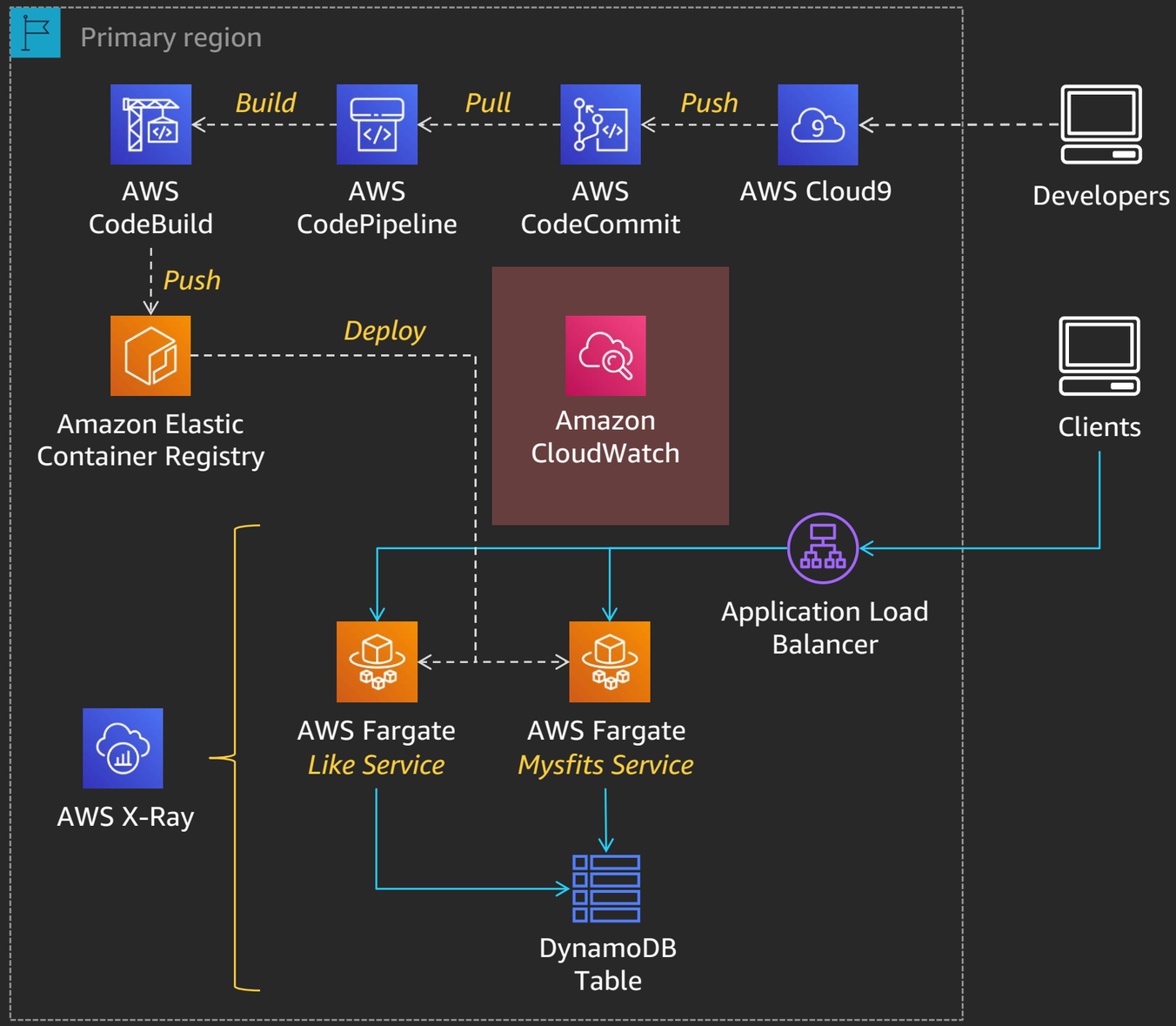




Objectives

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

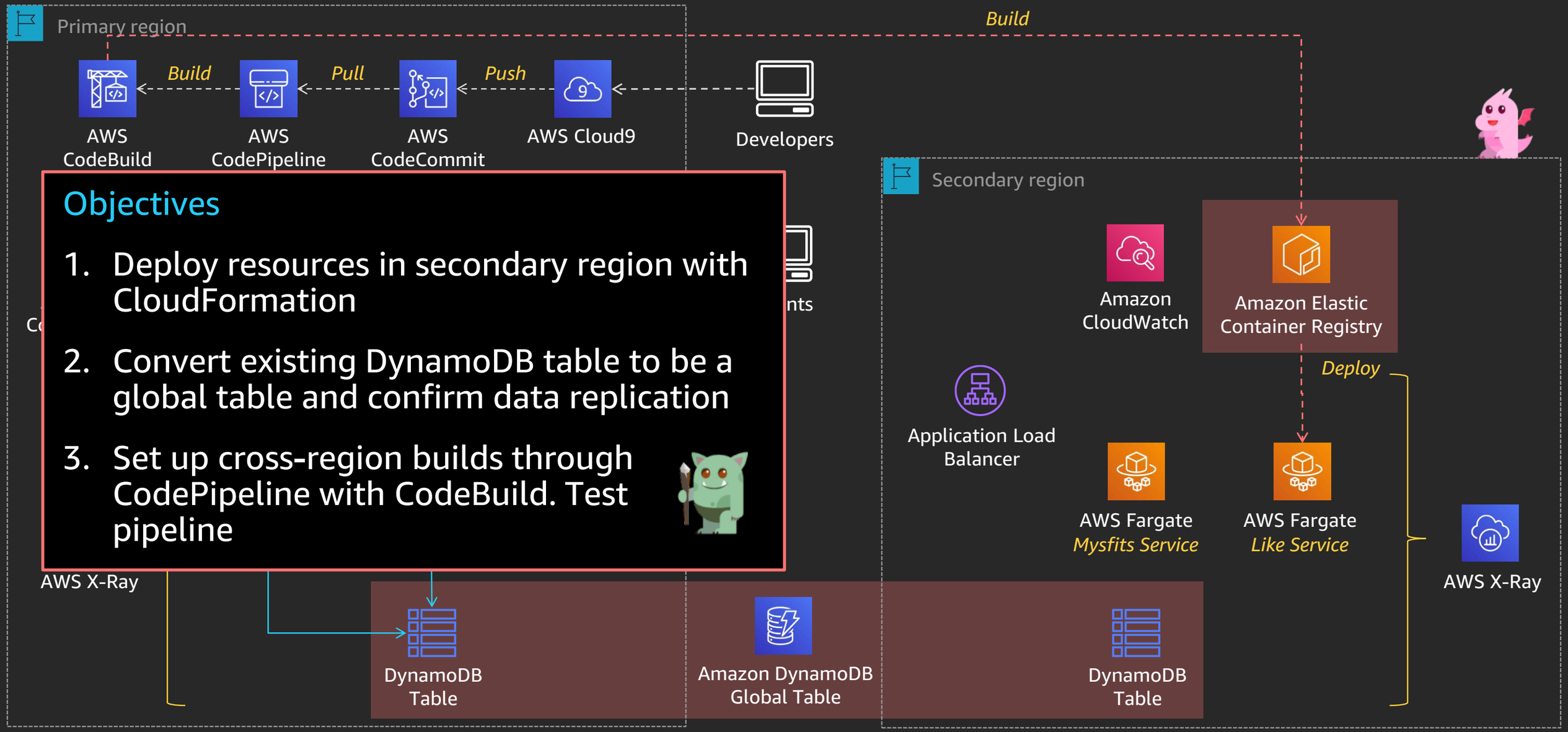


Objectives

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



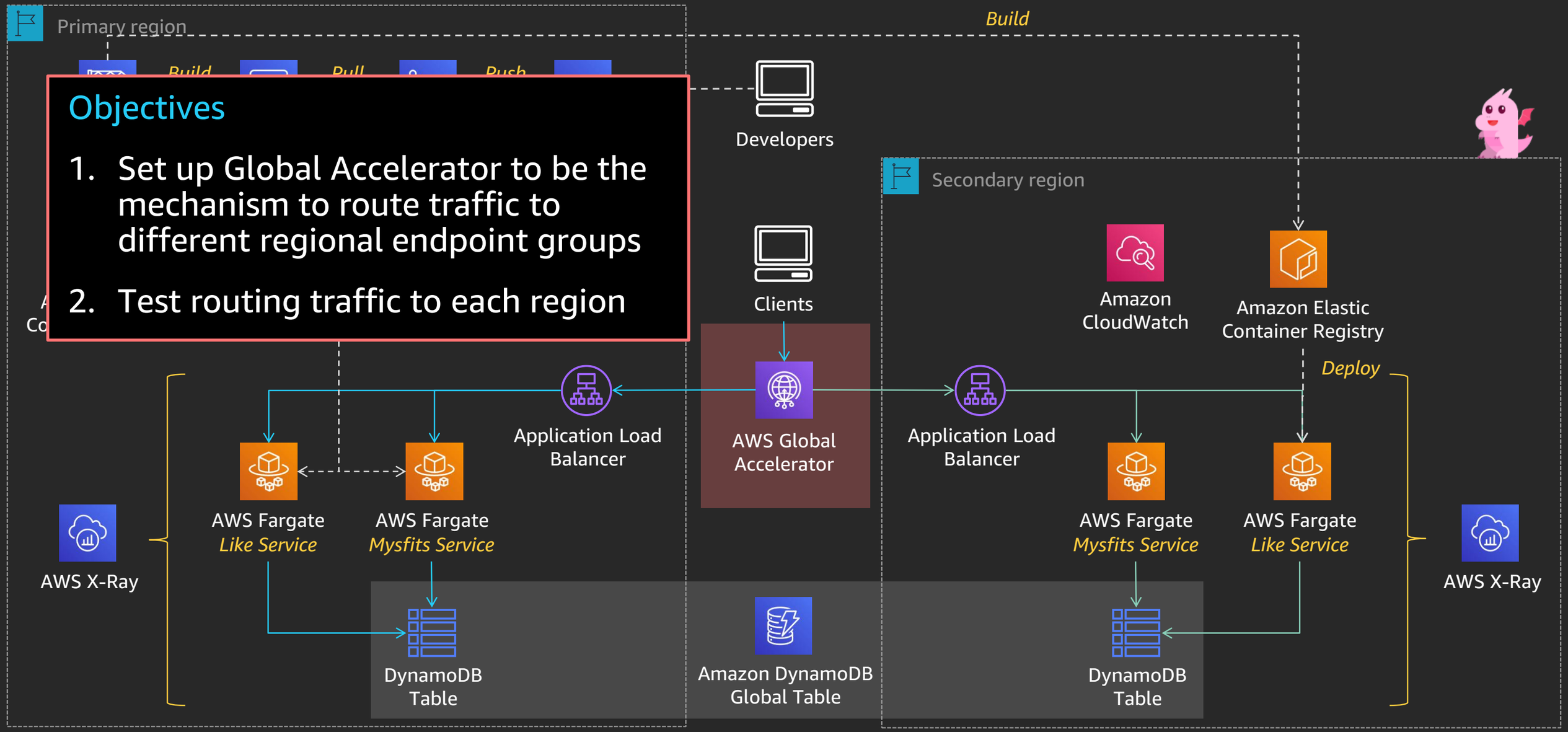
Mythical Mysfits architecture—Lab 3—Data + builds



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

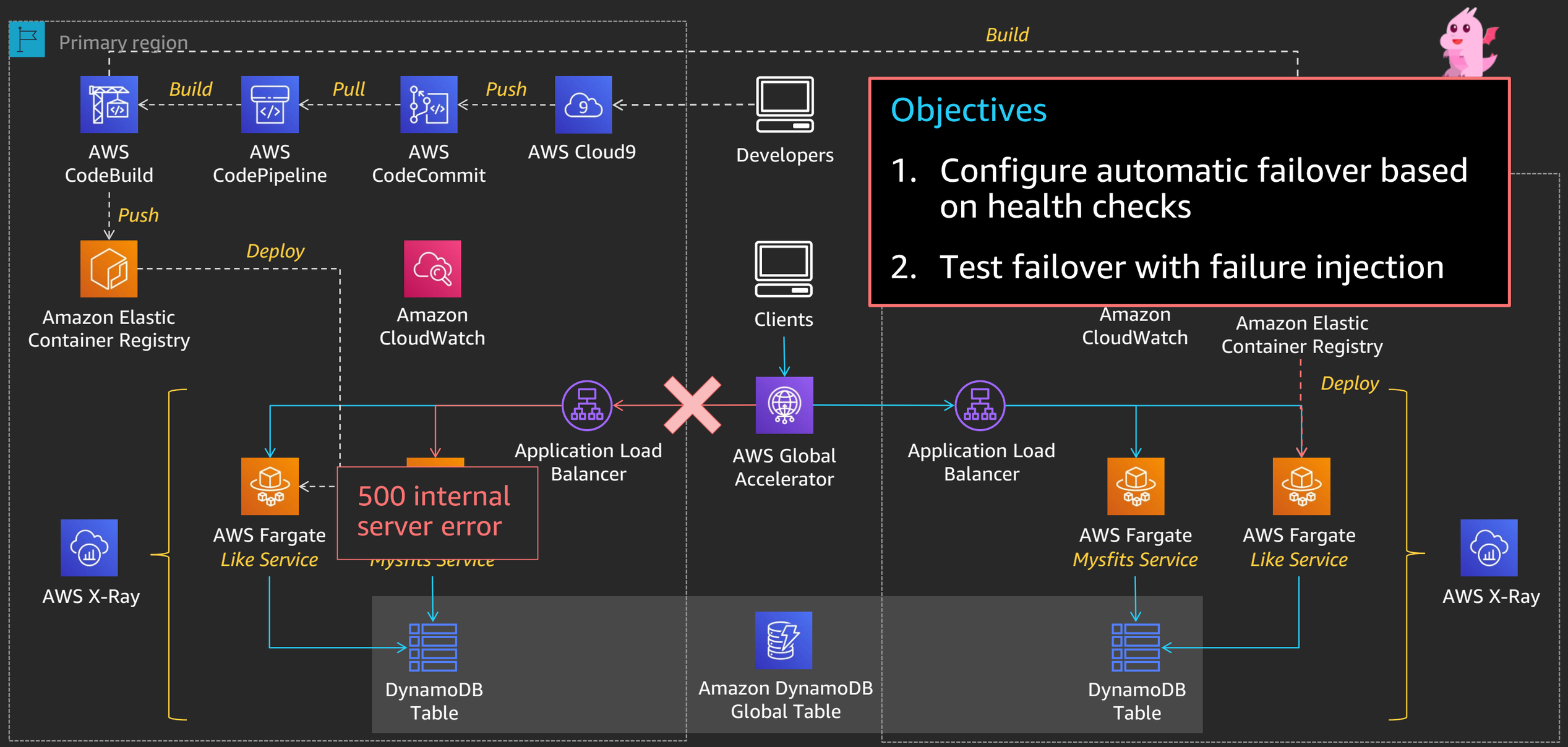
Mythical Mysfits architecture—Lab 4—Traffic routing



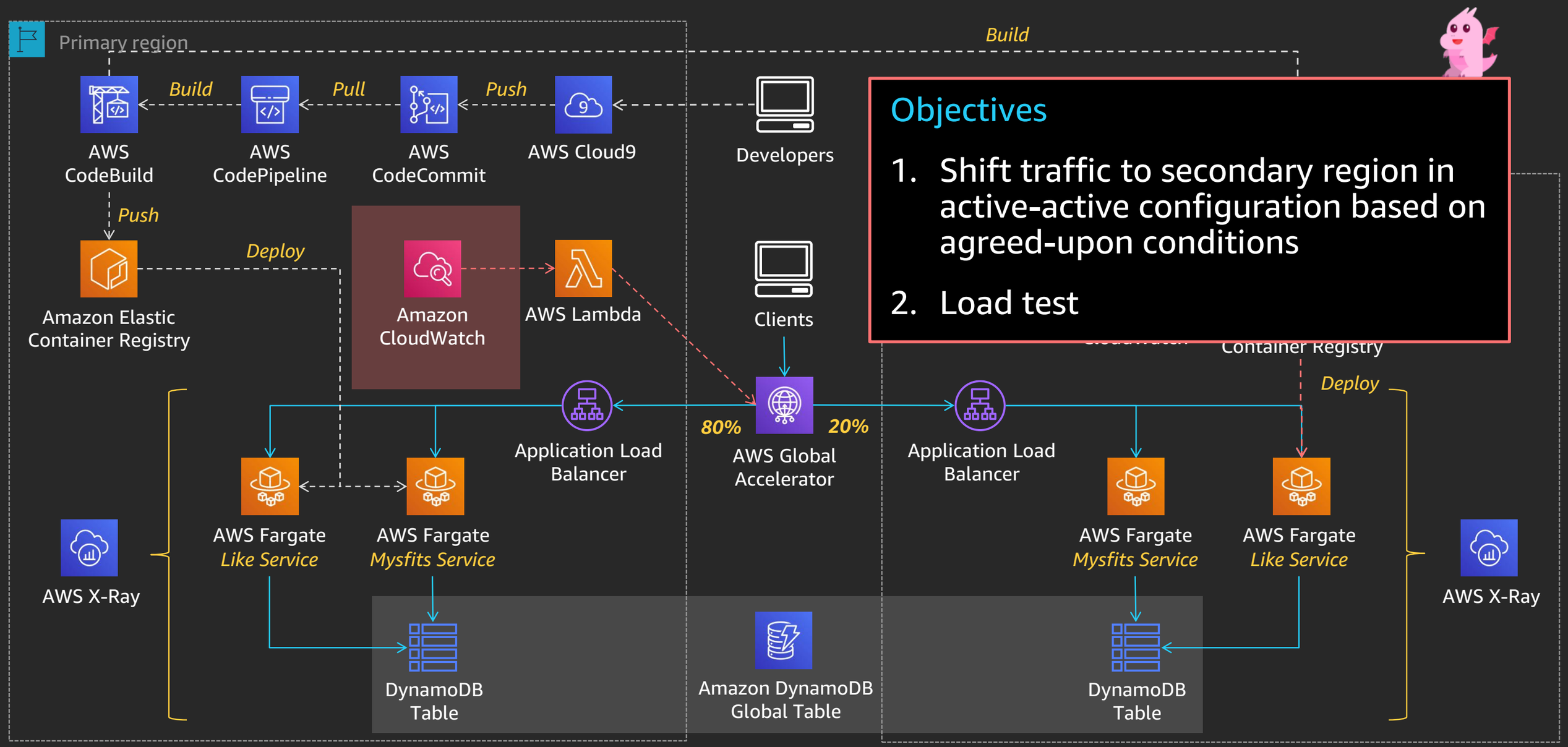
Objectives

1. Set up Global Accelerator to be the mechanism to route traffic to different regional endpoint groups
2. Test routing traffic to each region

Mythical Mysfits architecture—Lab 5—DR testing

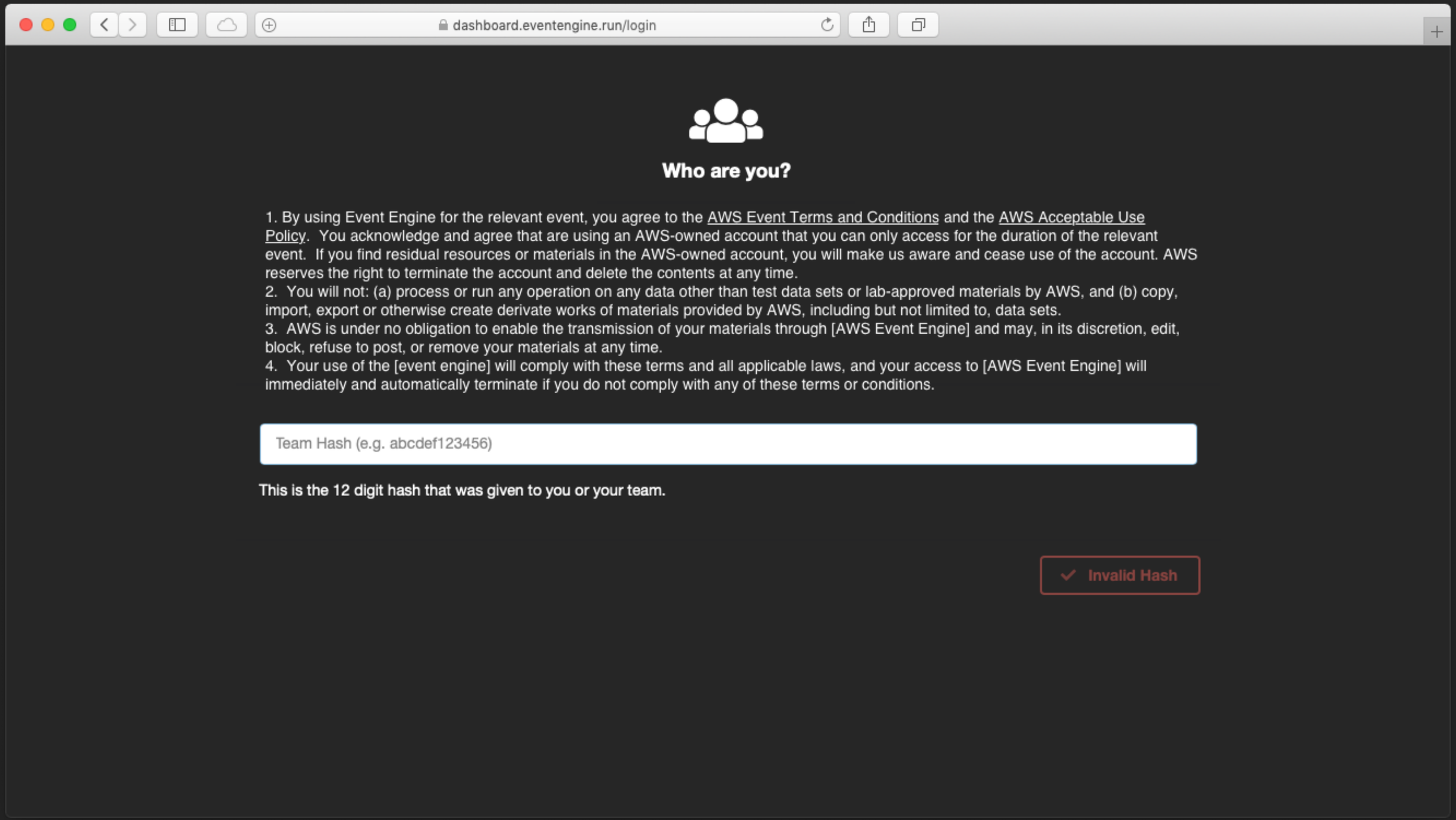


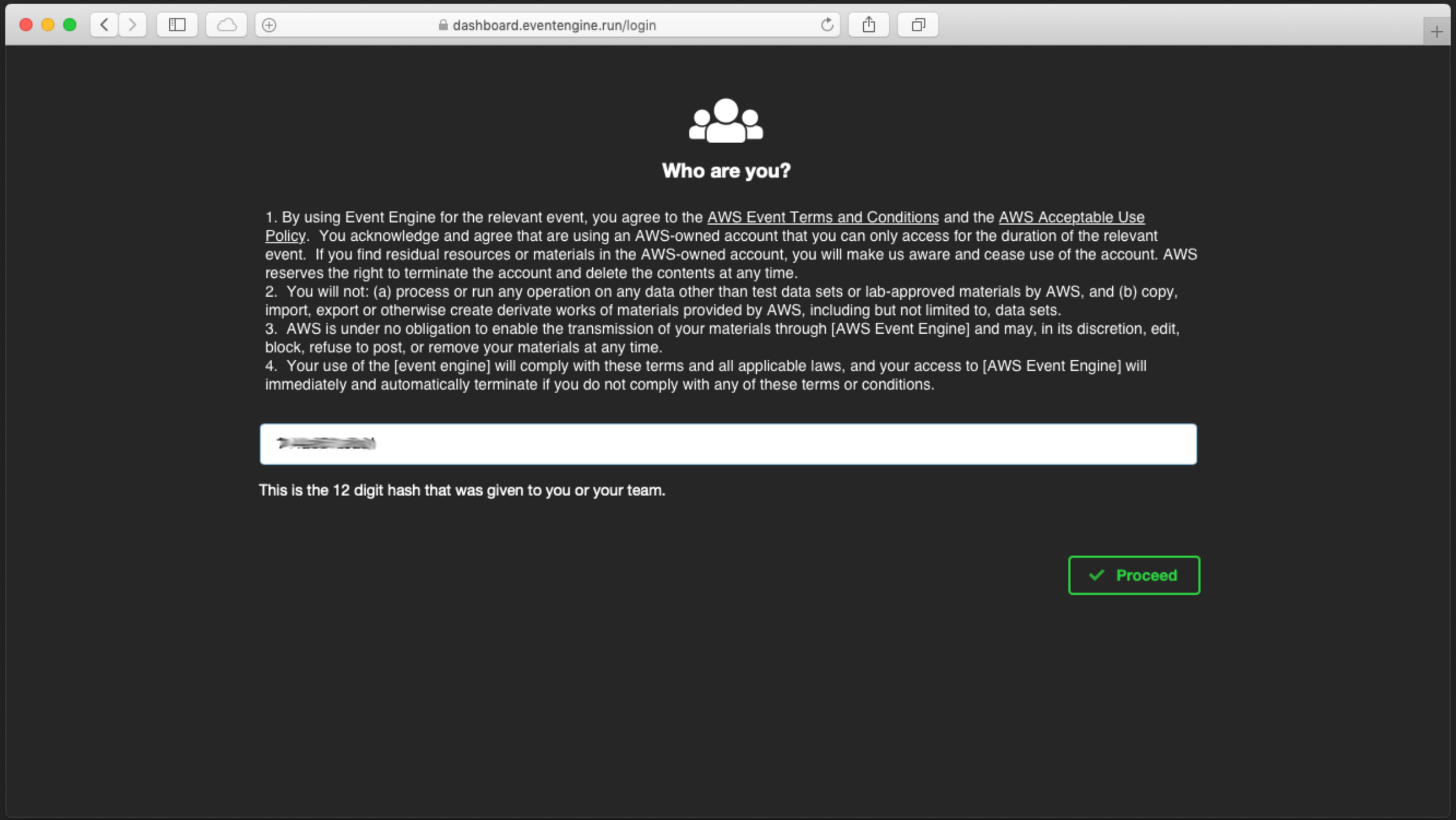
Mythical Mysfits architecture—Bonus—Active-active

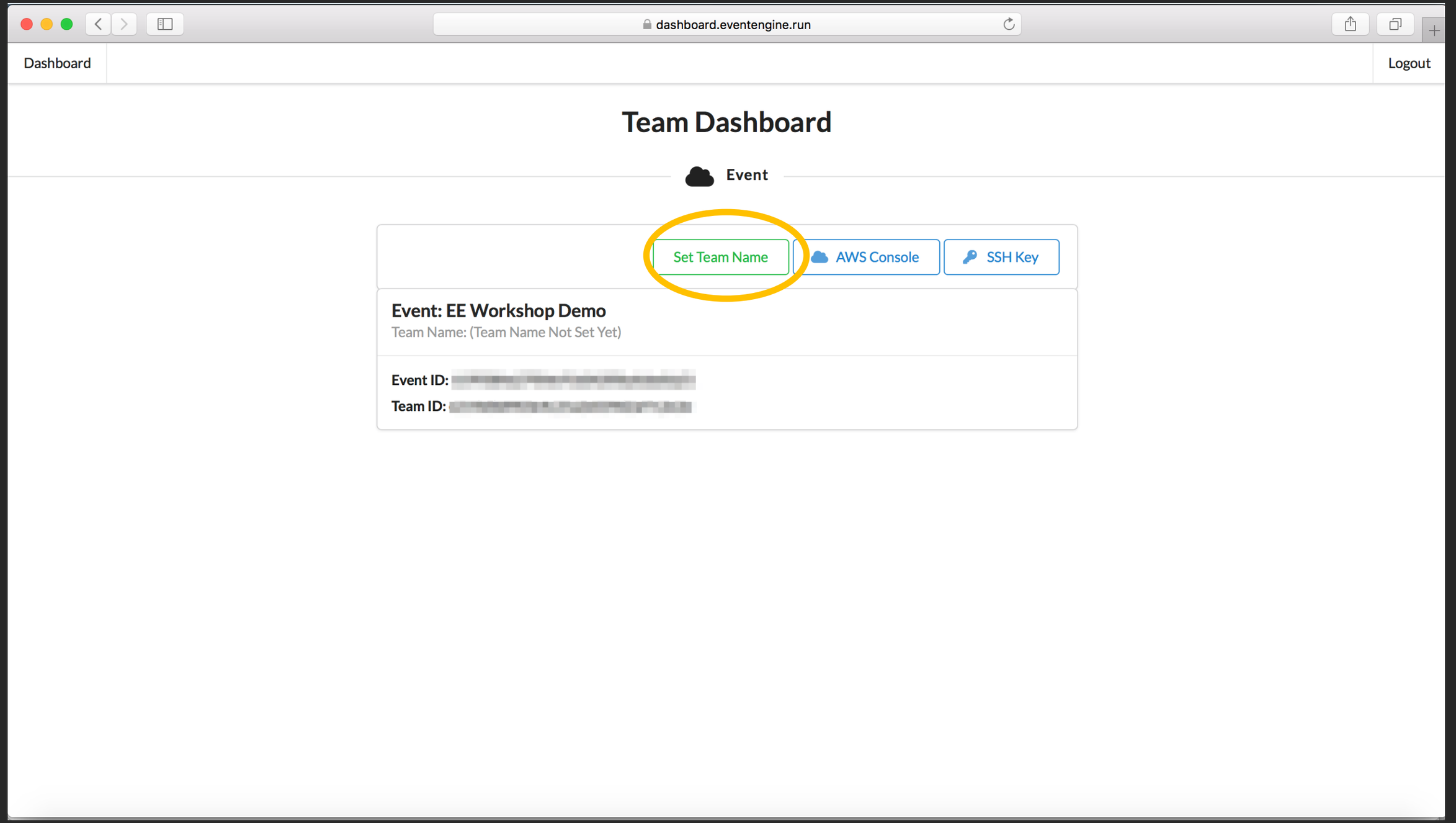


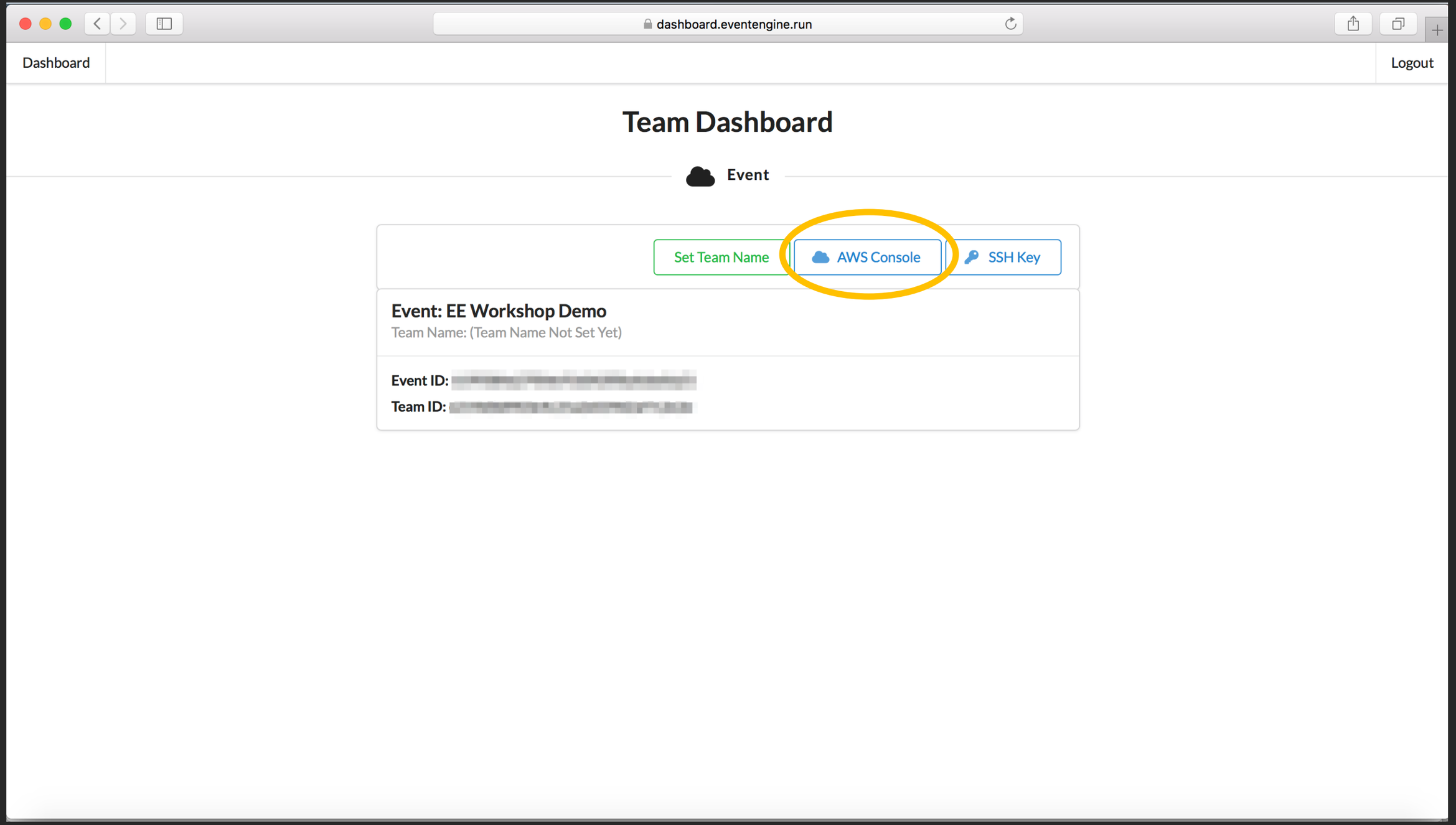
Logistics

https://dashboard.eventengine.run


dashboard.eventengine.run/login
Who are you?
1. By using Event Engine for the relevant event, you agree to the AWS Event Terms and Conditions and the AWS Acceptable Use Policy. You acknowledge and agree that are using an AWS-owned account that you can only access for the duration of the relevant event. If you find residual resources or materials in the AWS-owned account, you will make us aware and cease use of the account. AWS reserves the right to terminate the account and delete the contents at any time.
2. You will not: (a) process or run any operation on any data other than test data sets or lab-approved materials by AWS, and (b) copy, import, export or otherwise create derivate works of materials provided by AWS, including but not limited to, data sets.
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4. Your use of the [event engine] will comply with these terms and all applicable laws, and your access to [AWS Event Engine] will immediately and automatically terminate if you do not comply with any of these terms or conditions.
Team Hash (e.g. abcdef123456)
This is the 12 digit hash that was given to you or your team.
Invalid Hash


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2. You will not: (a) process or run any operation on any data other than test data sets or lab-approved materials by AWS, and (b) copy, import, export or otherwise create derivate works of materials provided by AWS, including but not limited to, data sets.
3. AWS is under no obligation to enable the transmission of your materials through [AWS Event Engine] and may, in its discretion, edit, block, refuse to post, or remove your materials at any time.
4. Your use of the [event engine] will comply with these terms and all applicable laws, and your access to [AWS Event Engine] will immediately and automatically terminate if you do not comply with any of these terms or conditions.
This is the 12 digit hash that was given to you or your team.
Proceed


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Dashboard
Logout
Team Dashboard
Event
Set Team Name
AWS Console
SSH Key
Event: EE Workshop Demo
Team Name: (Team Name Not Set Yet)
Event ID:
Team ID:


dashboard.eventengine.run
Dashboard
Logout
Team Dashboard
Event
Set Team Name
AWS Console
SSH Key
Event: EE Workshop Demo
Team Name: (Team Name Not Set Yet)
Event ID:
Team ID:

AWS Console Login

Remember to only use "[redacted]" as your region, unless otherwise directed by the event operator.

Login Link

Open AWS Console | Copy Login Link

Credentials / CLI Snippets

Mac / Linux | Windows

Mac or Linux

```
export AWS_DEFAULT_REGION=[redacted]
export AWS_ACCESS_KEY_ID=[redacted]
export AWS_SECRET_ACCESS_KEY=[redacted]
export AWS_SESSION_TOKEN=[redacted]
```

How do I use the AWS CLI?

Checkout the AWS CLI documentation here: https://docs.aws.amazon.com/cli/latest/userguide/cli-chap-welcome.html

OK

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!

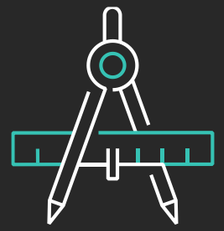
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aws-mythical-mysfits@amazon.com




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