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

NFX303

The evolution of chaos engineering at Netflix

Aleš Plšek (he/him)

Senior Software Engineer, Resilience
Netflix

Rob Hilton

Principal Solutions Architect
AWS

© 2023, Amazon Web Services, Inc. or its affiliates. All rights reserved.







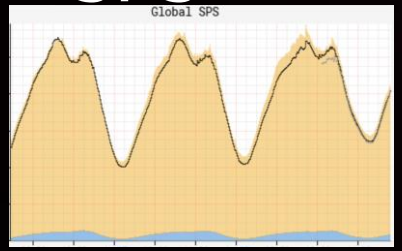
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.



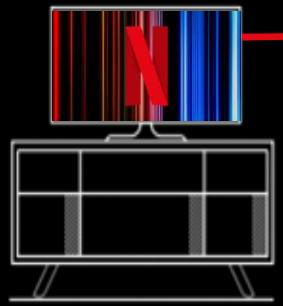
A Brief History of ~~Time~~ Chaos

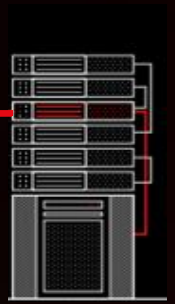
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

SPS



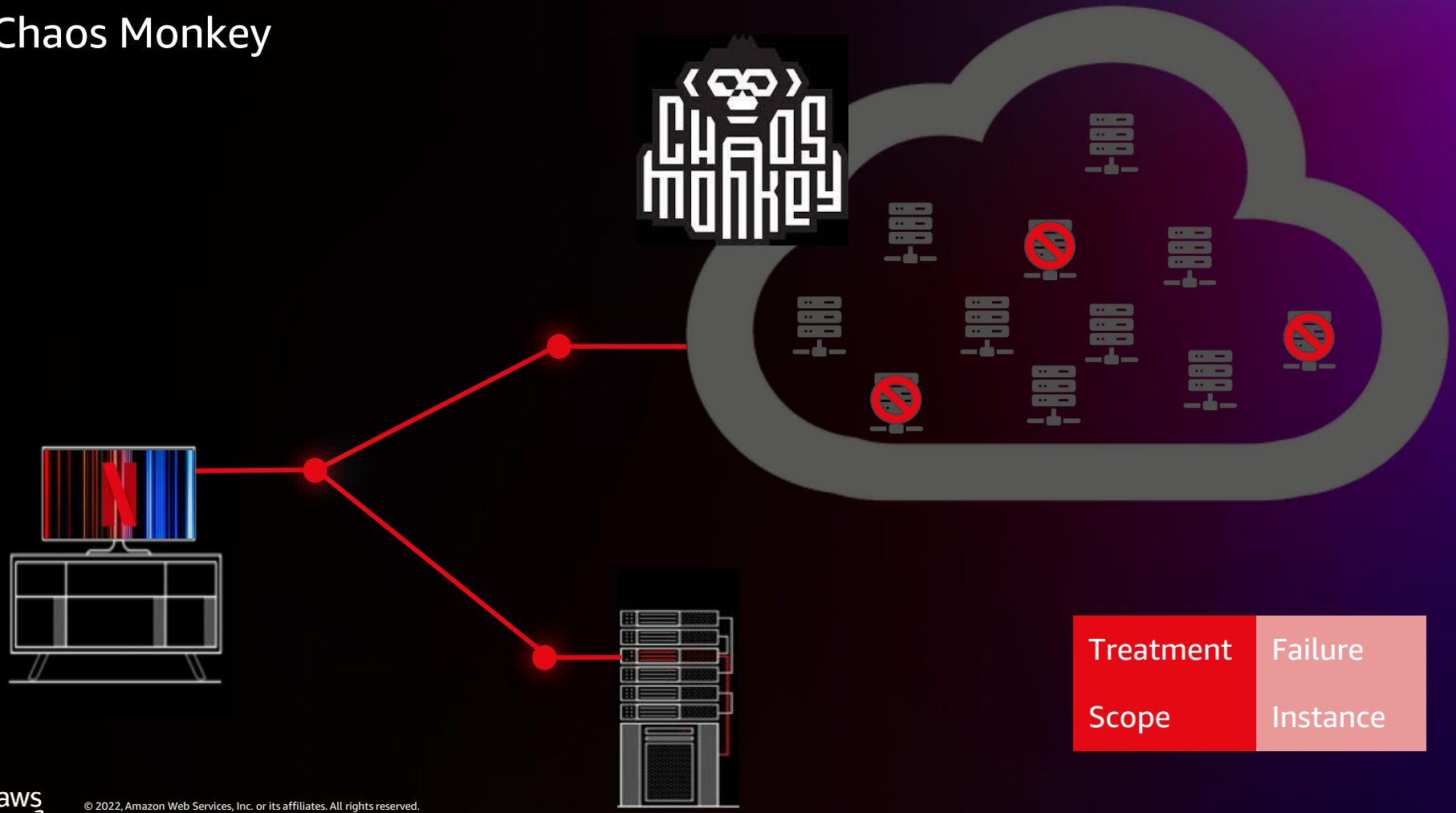






aws
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

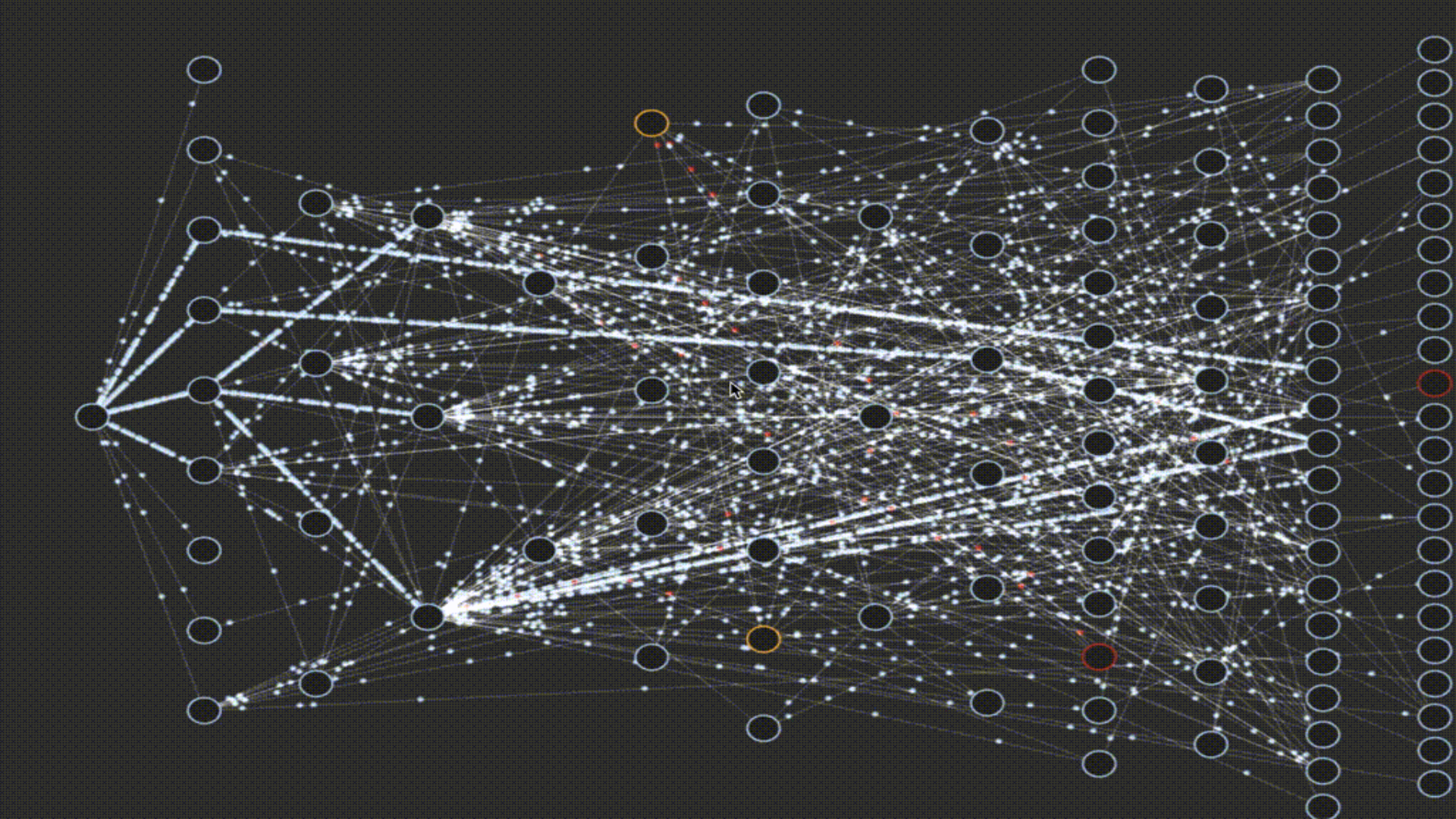
Chaos Monkey

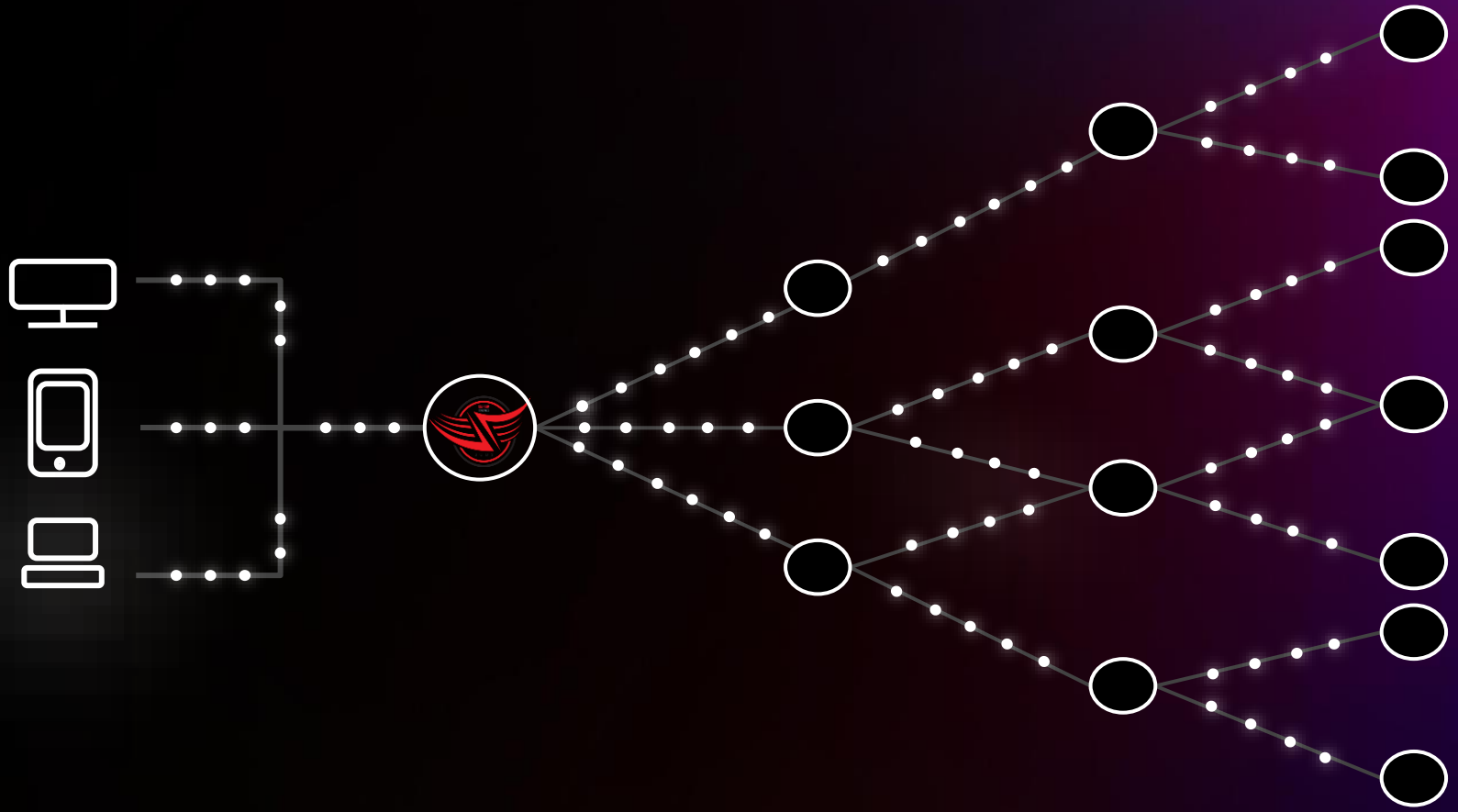


© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

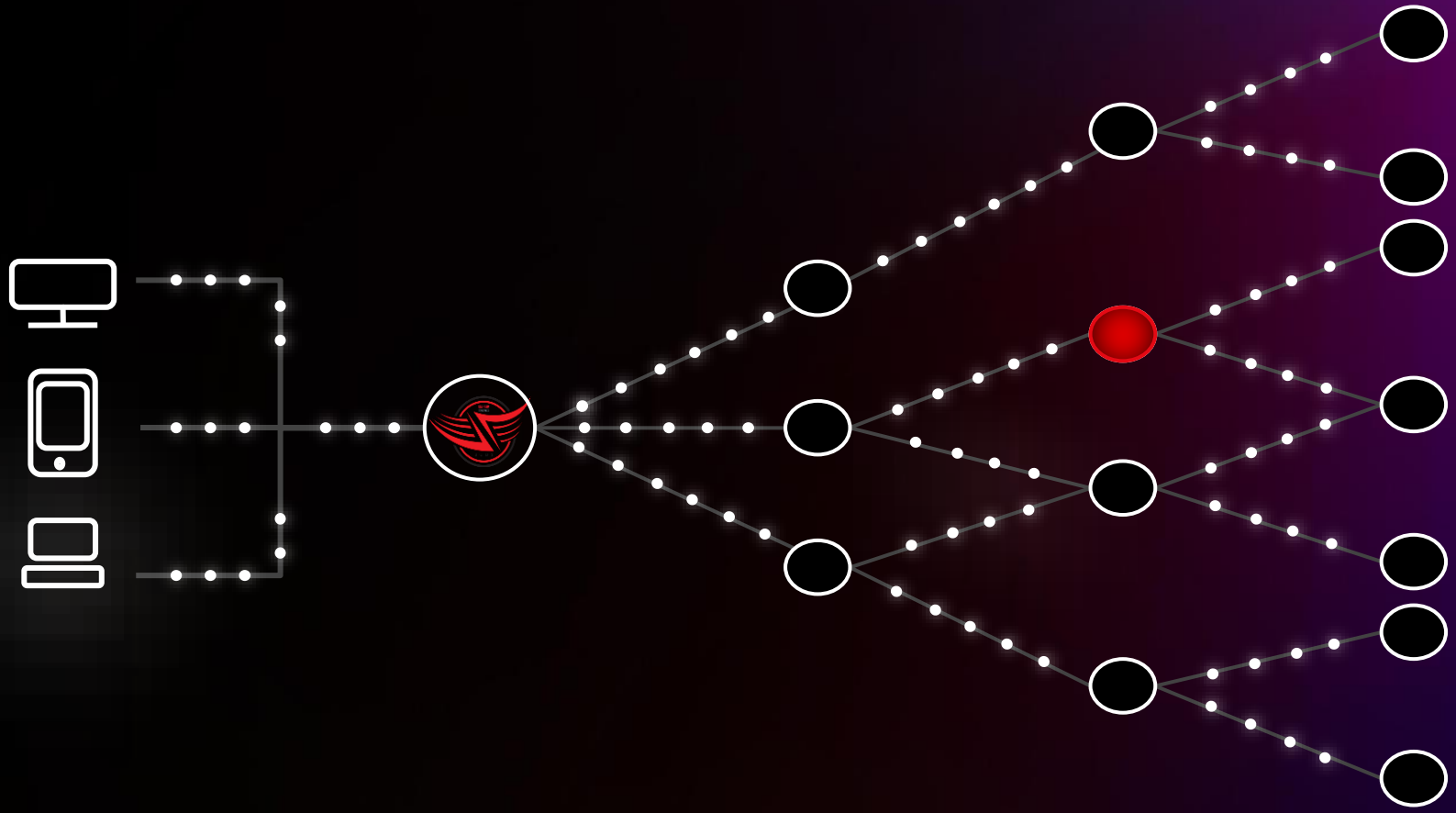






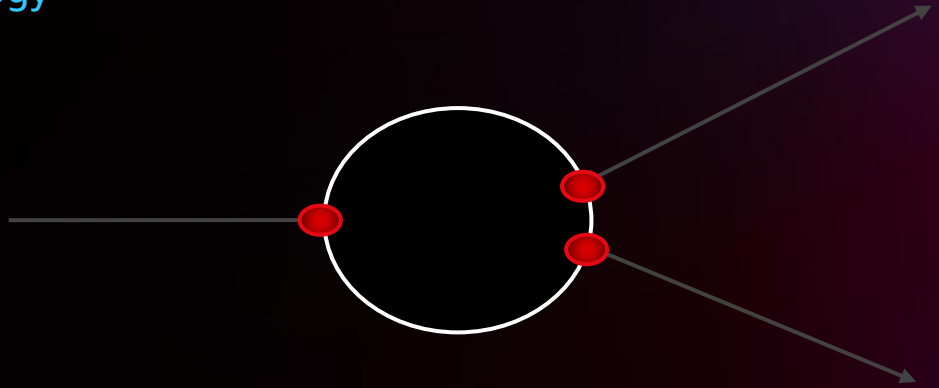


© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.



© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

FIT
Failure Injection Technology



Injection Point

IPC	REST, gRPC, GraphQL
DB	Cassandra, MySQL
Cache	evCache
…	SQS, Kafka, S3,…

Treatment

- Failure
- Delay
- Delay + Failure

Scope

- Instance
- Cluster

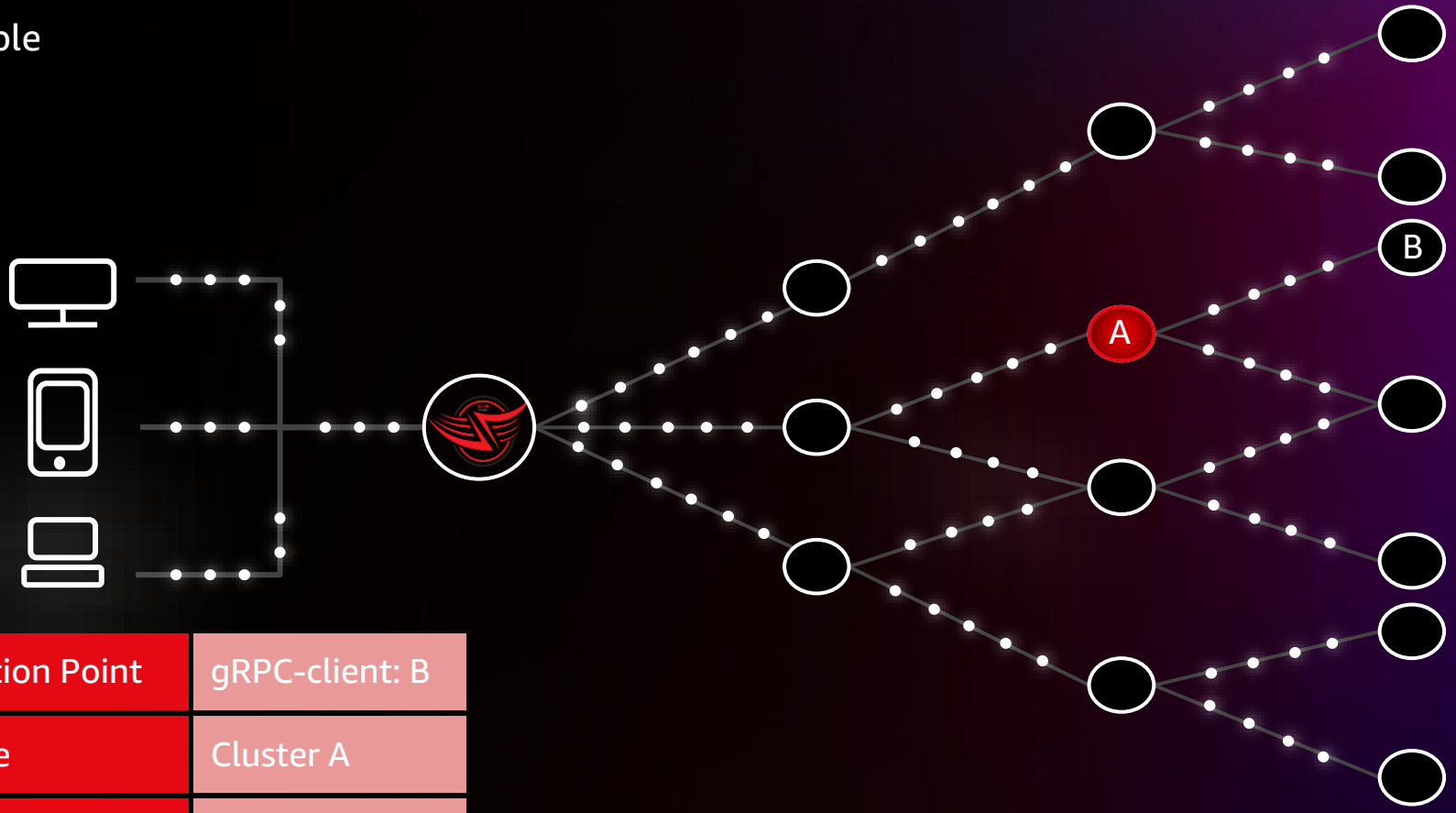
Scenario

- Injection Point [ ]
- Treatment [ ]
- Scope

Session

aws
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

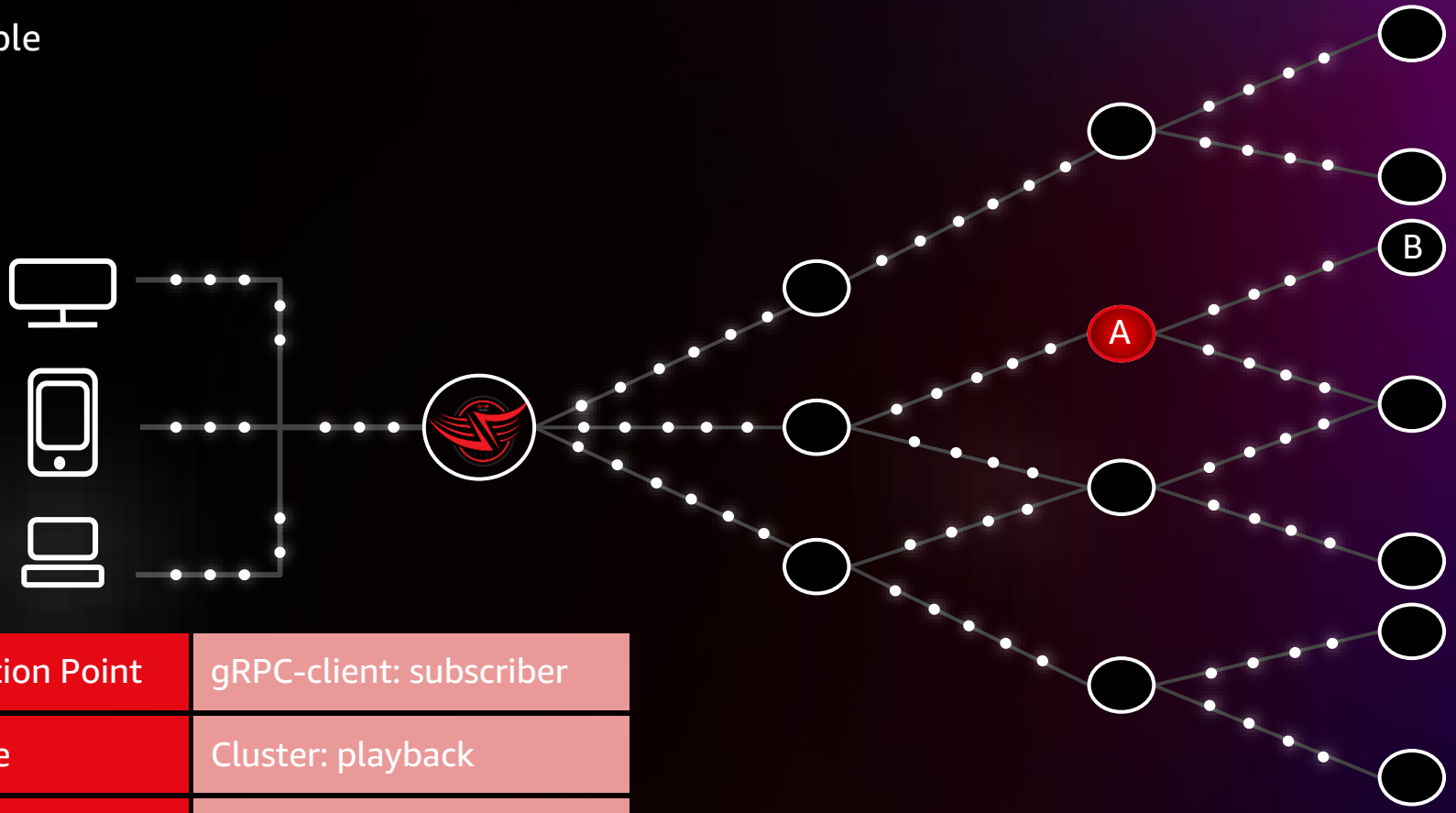
FIT
Example



Injection Point	gRPC-client: B
Scope	Cluster A
Treatment	Failure

© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

FIT
Example



Injection Point	gRPC-client: subscriber
Scope	Cluster: playback
Treatment	Failure

© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Request Context

CRR



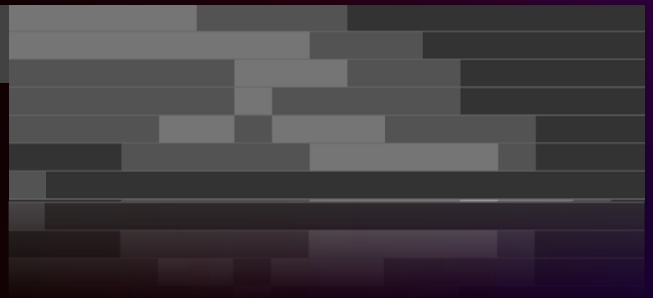
CRR + FIT Filter

Scope

- Instance
- Cluster
- Request + Cluster

Headers	content-type	application/json,
	accept	gzip
	x-nflx-fit-fail	…

Body



aws

© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Failure Injection

Scoped to Request

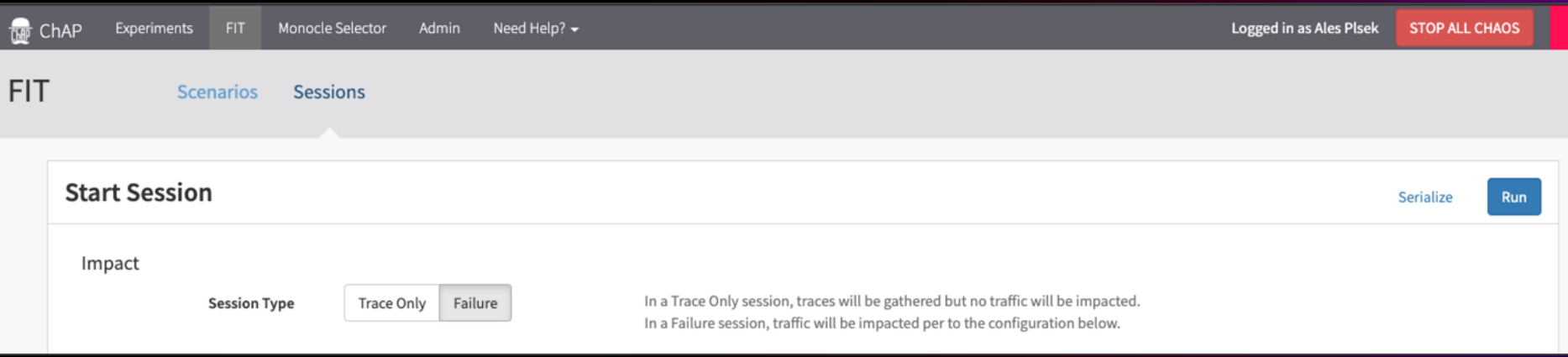


Injection Point	gRPC-client: B	
Scope	Cluster: A	CID: #1234
Treatment	Failure	

aws

© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Failure Injection
FIT UI



© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

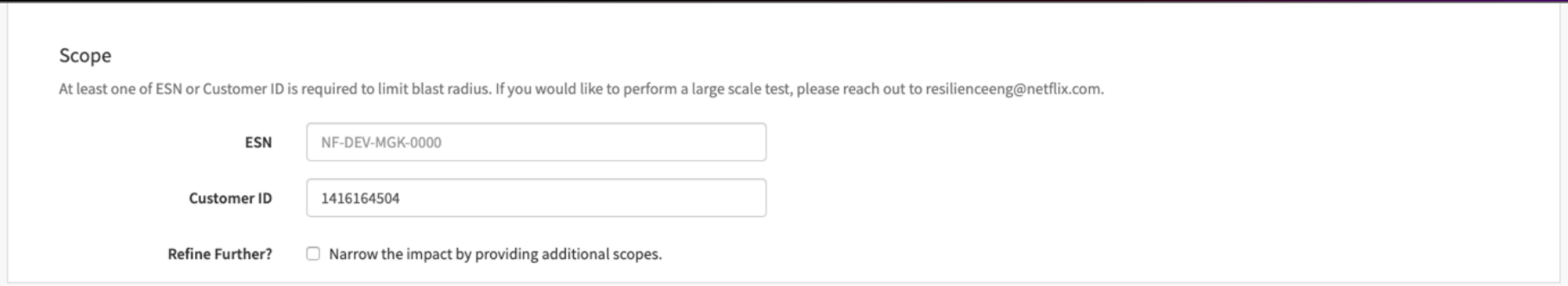
Failure Injection

FIT UI

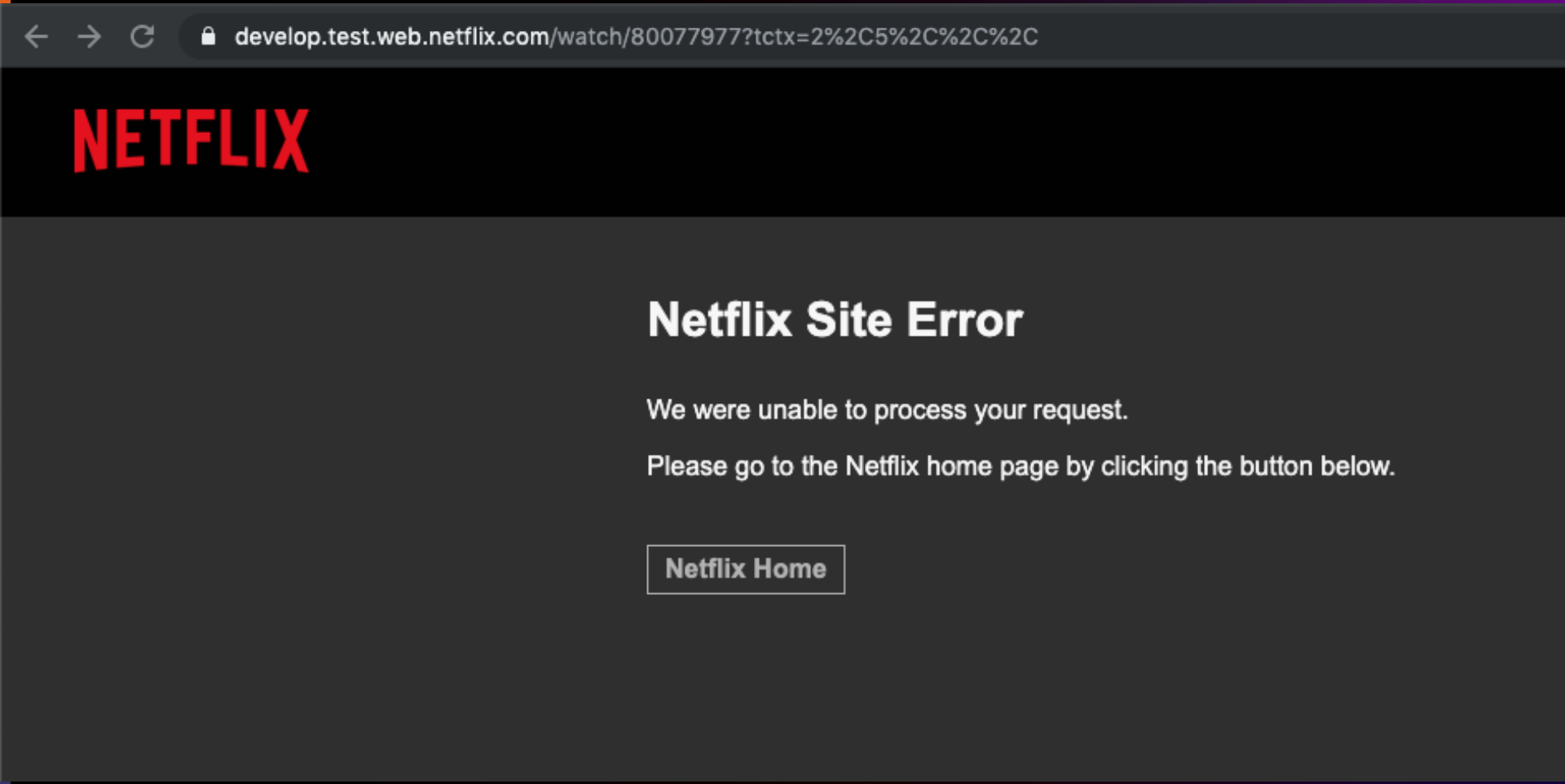


© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Failure Injection
Scoped to CustomerID

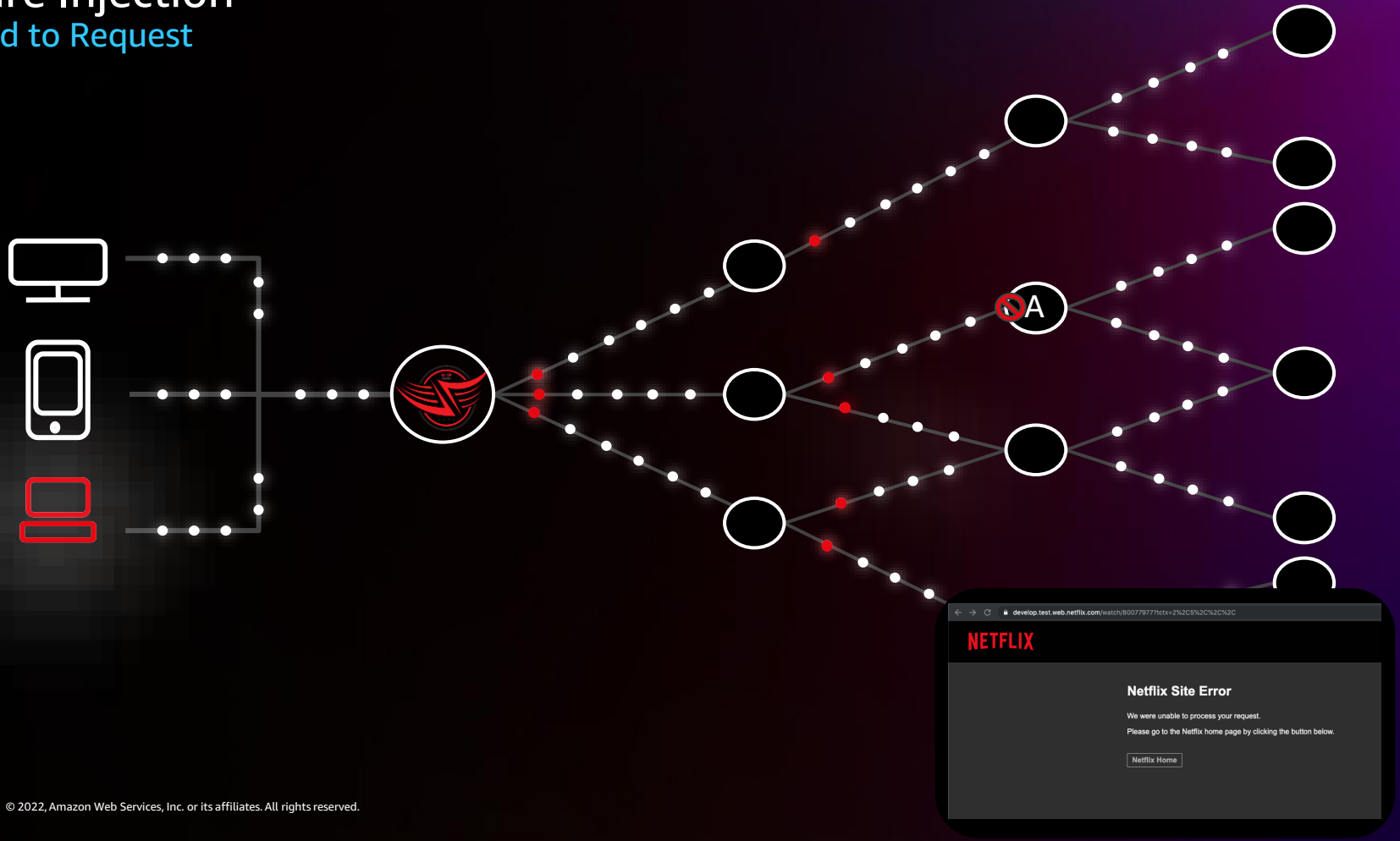


© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

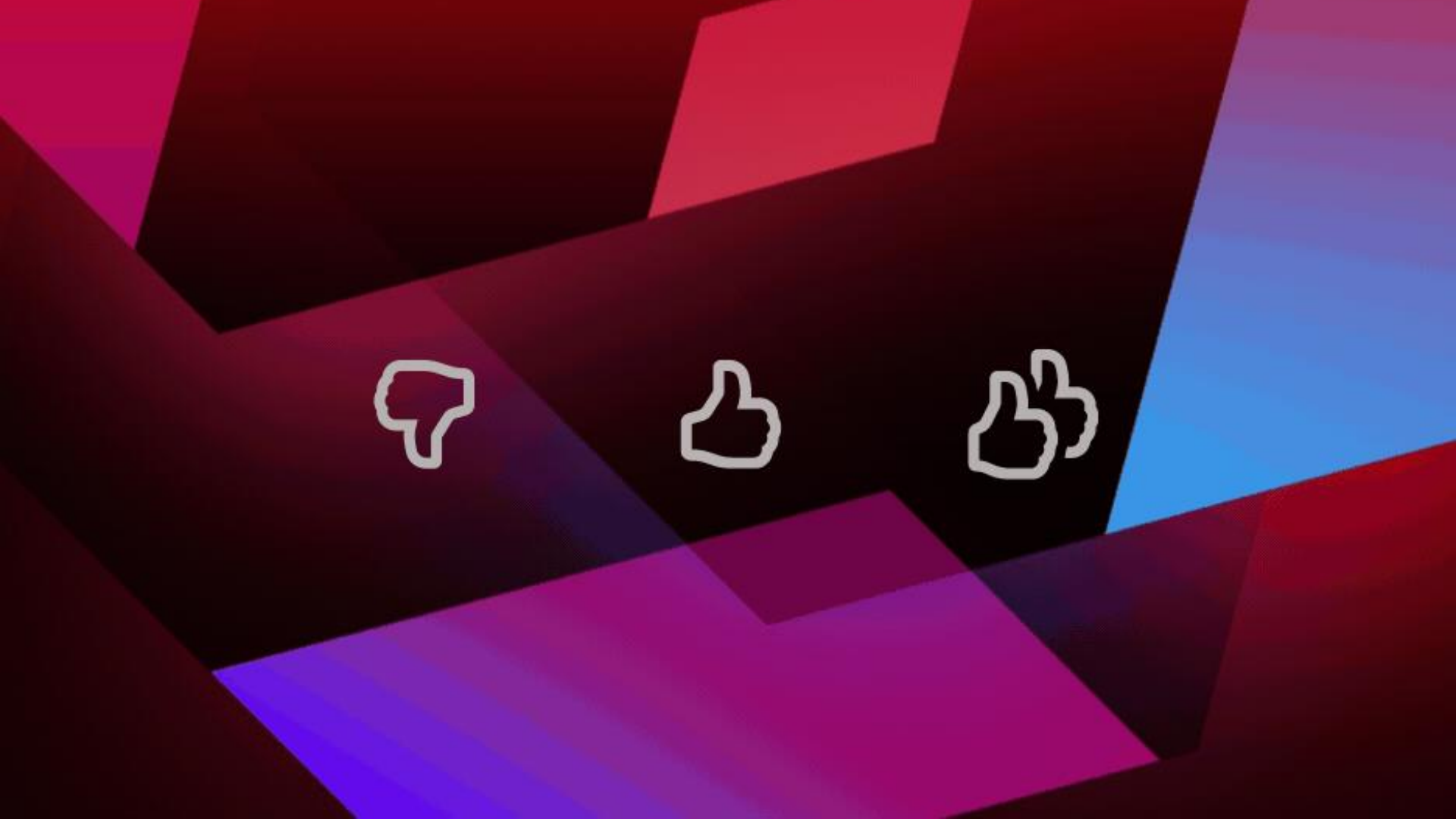


aws
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Failure Injection
Scoped to Request



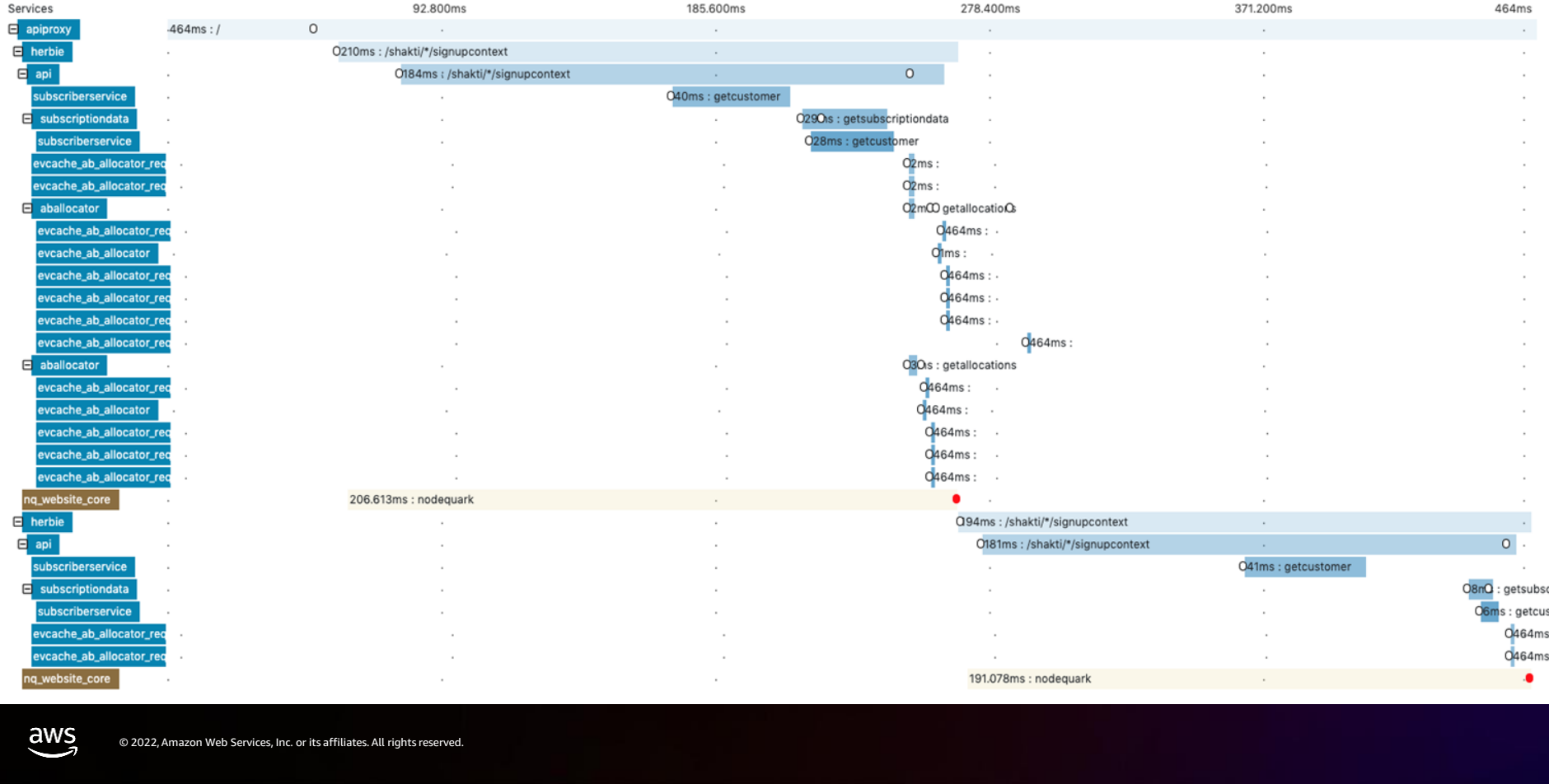
aws
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.





Injection Point	GRPC client: ratings	
Scope	Cluster: playback	CID: #1234
Treatment	Failure	

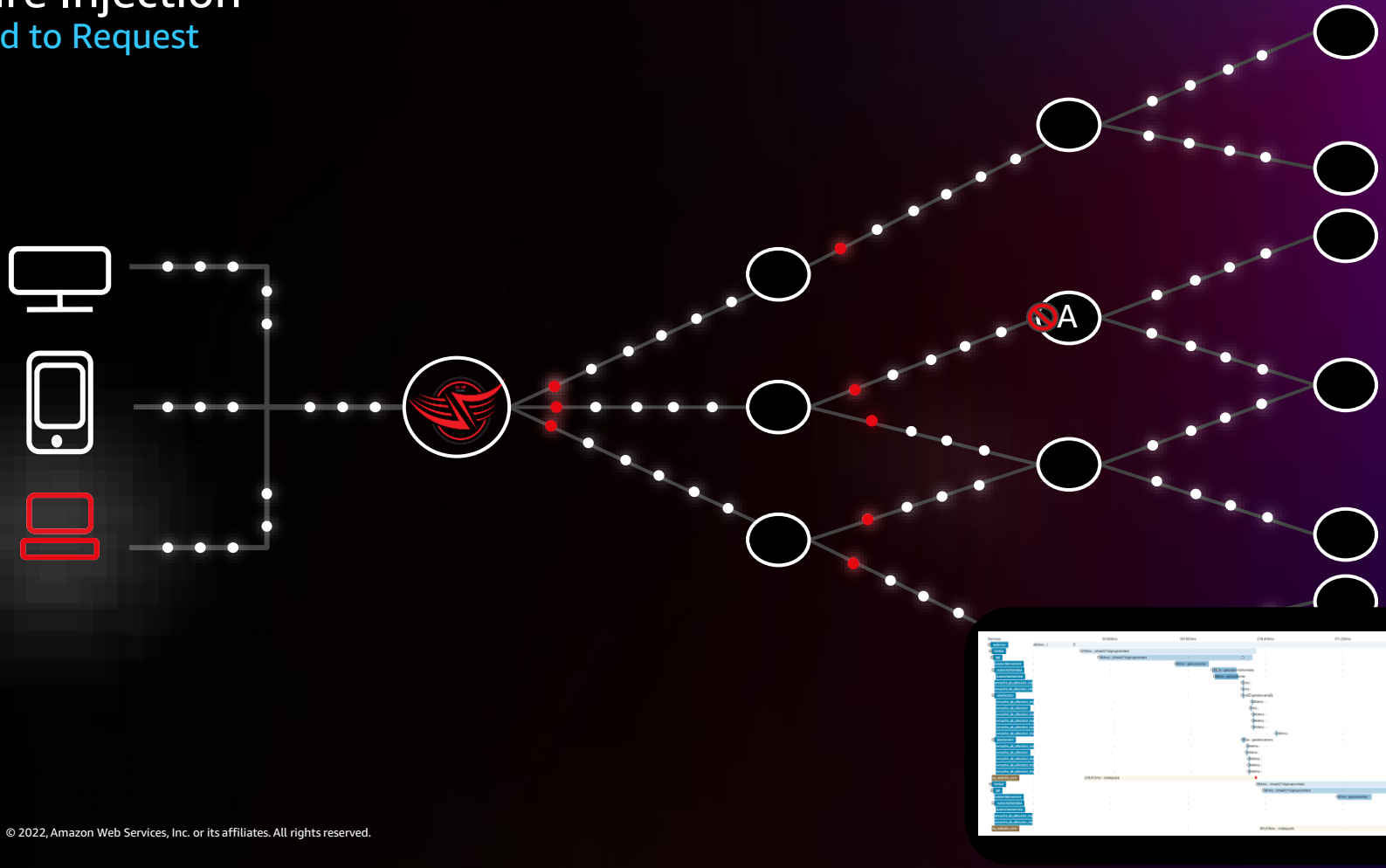
aws
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.



© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Failure Injection

Scoped to Request



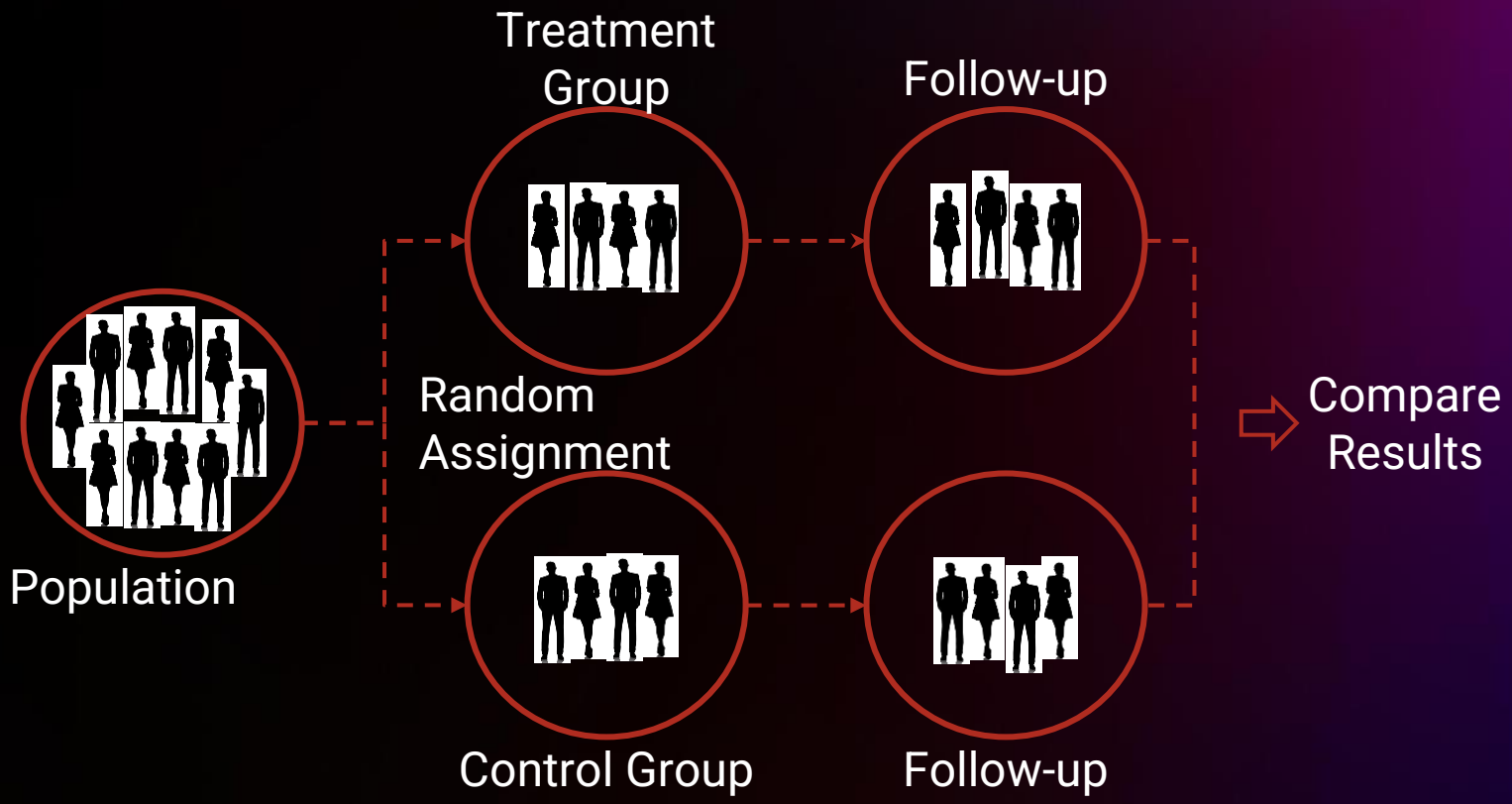
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.





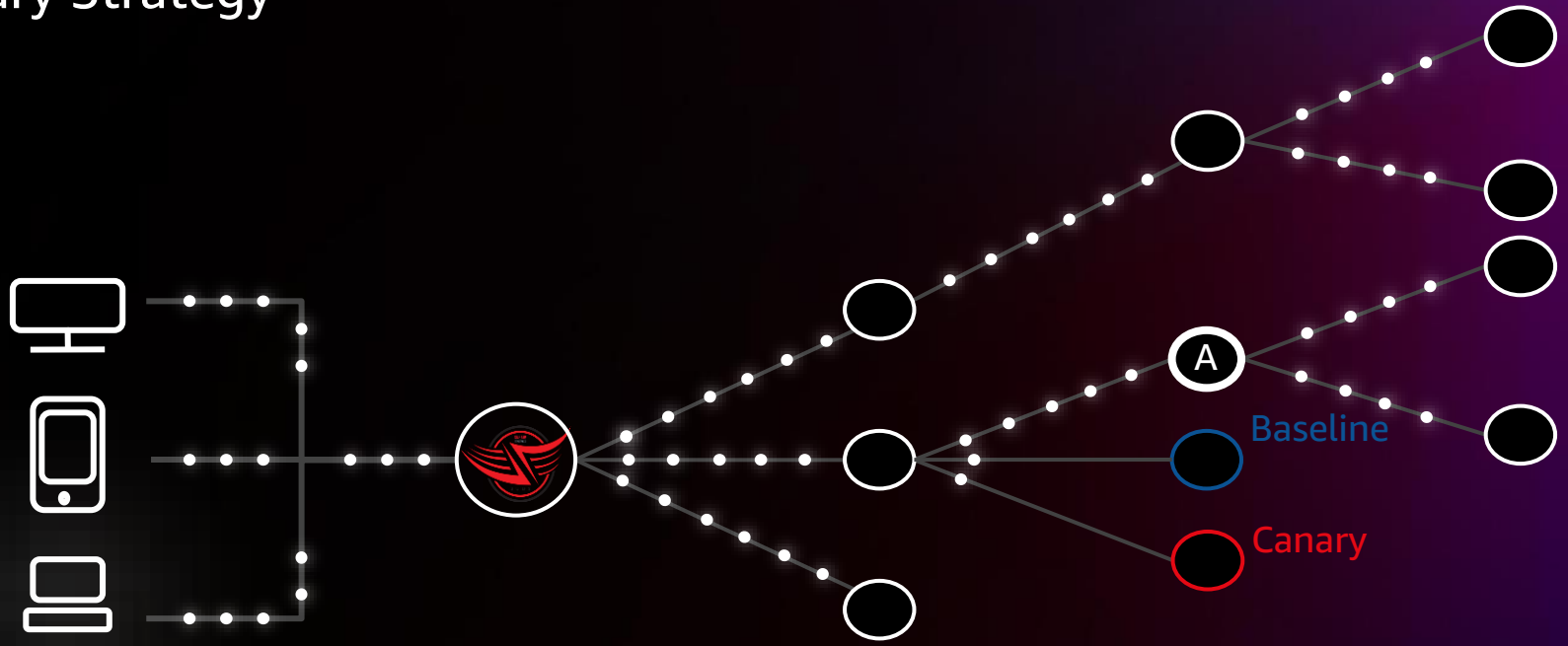
Canary Strategy

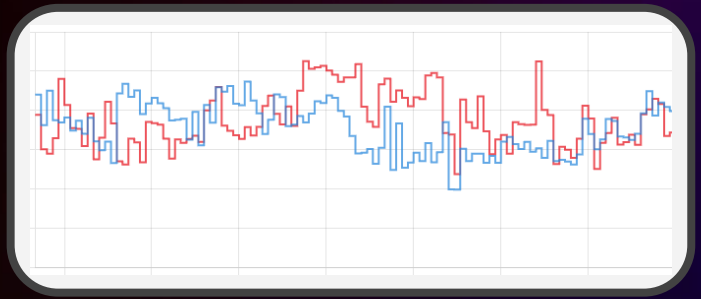
Randomized Control Experiment



aws
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

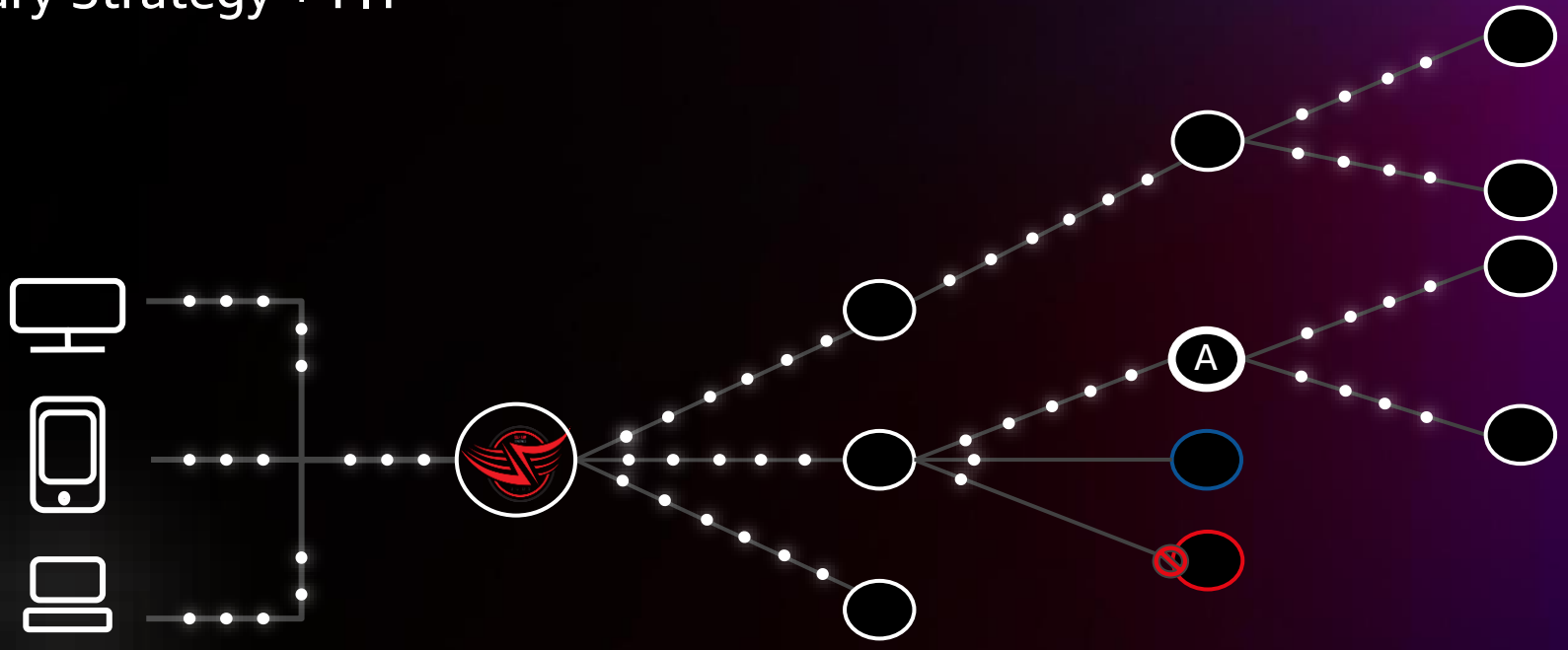
Canary Strategy





aws
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Canary Strategy + FIT

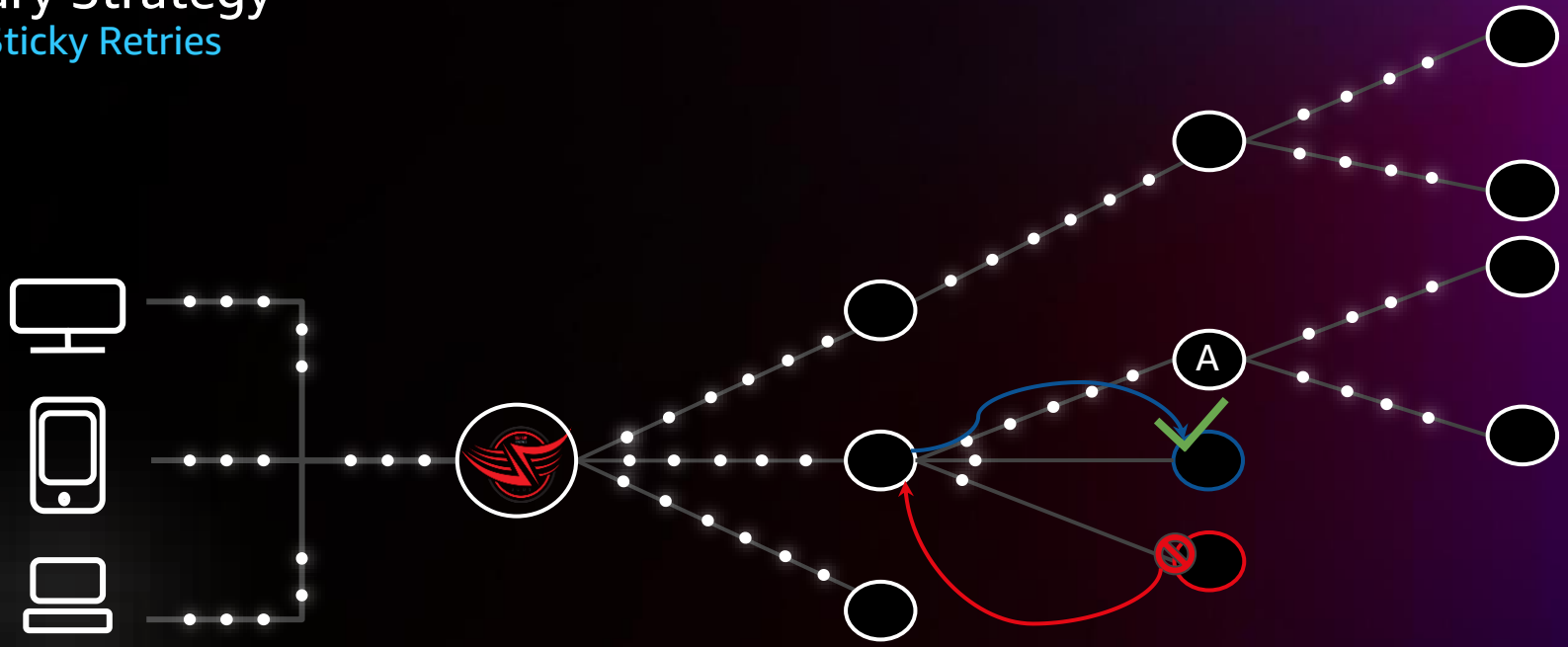


Injection Point	gRPC-client: B
Scope	Cluster: A-canary
Treatment	Failure

aws
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Canary Strategy

Non-Sticky Retries

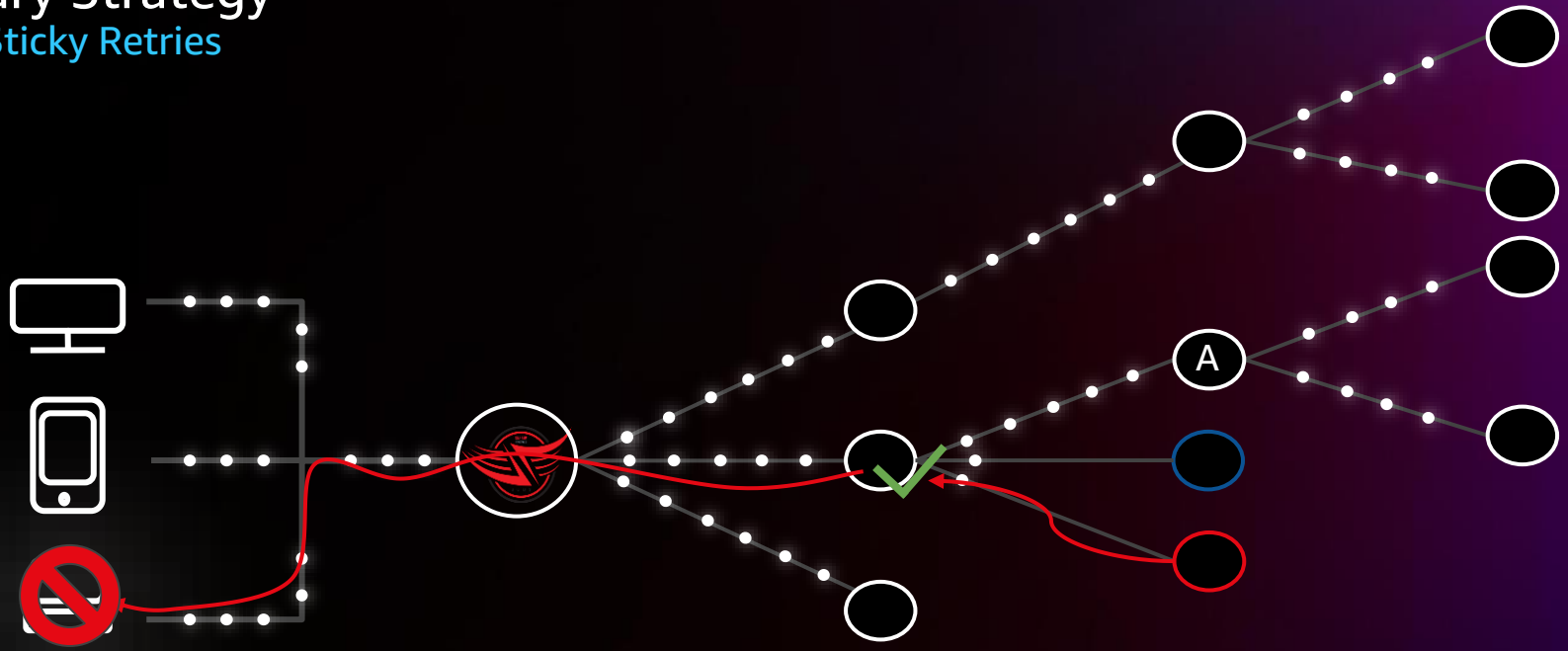


aws

© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Canary Strategy

Non-Sticky Retries

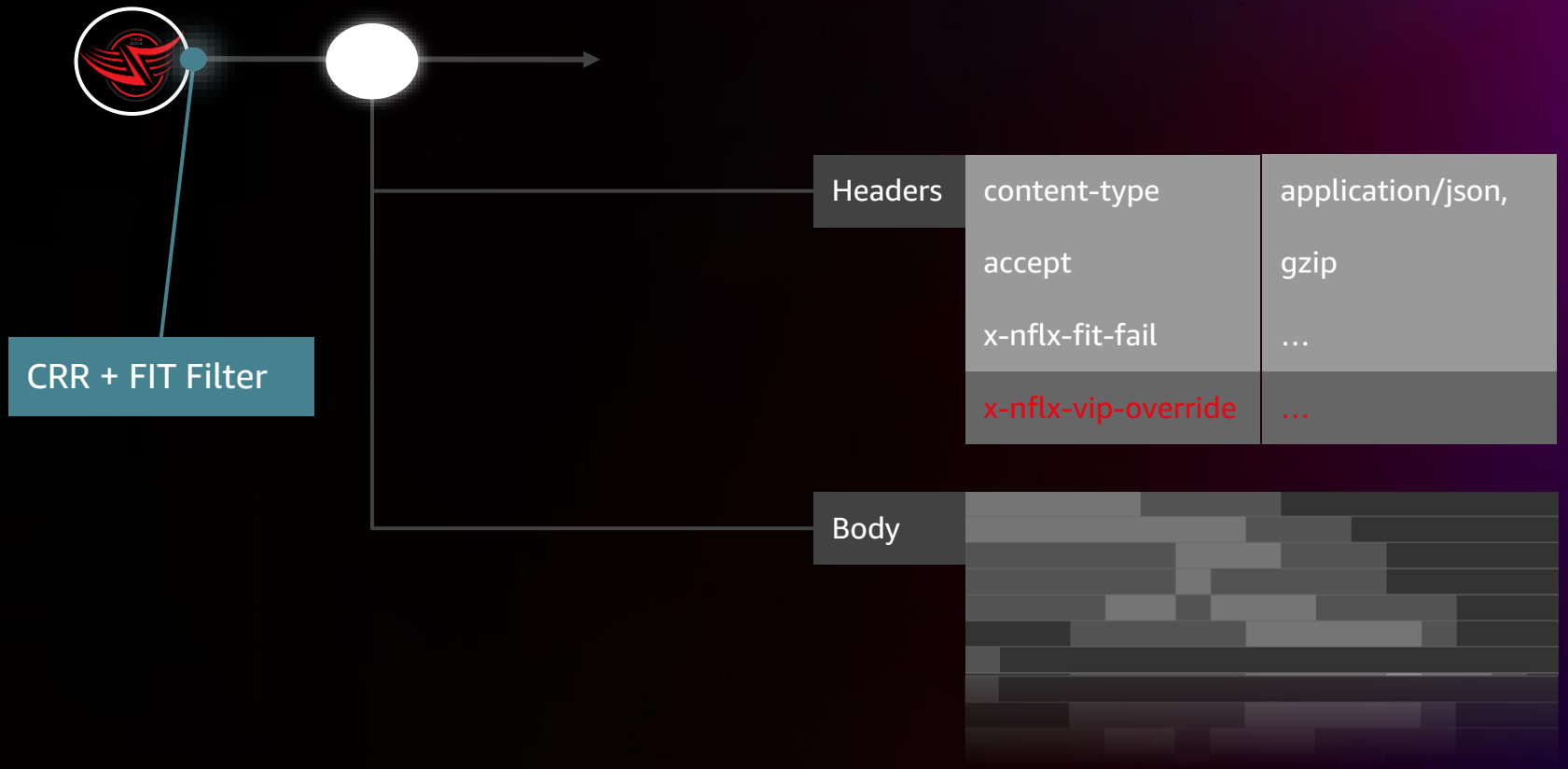


aws

© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

CRR - Custom Request Routing

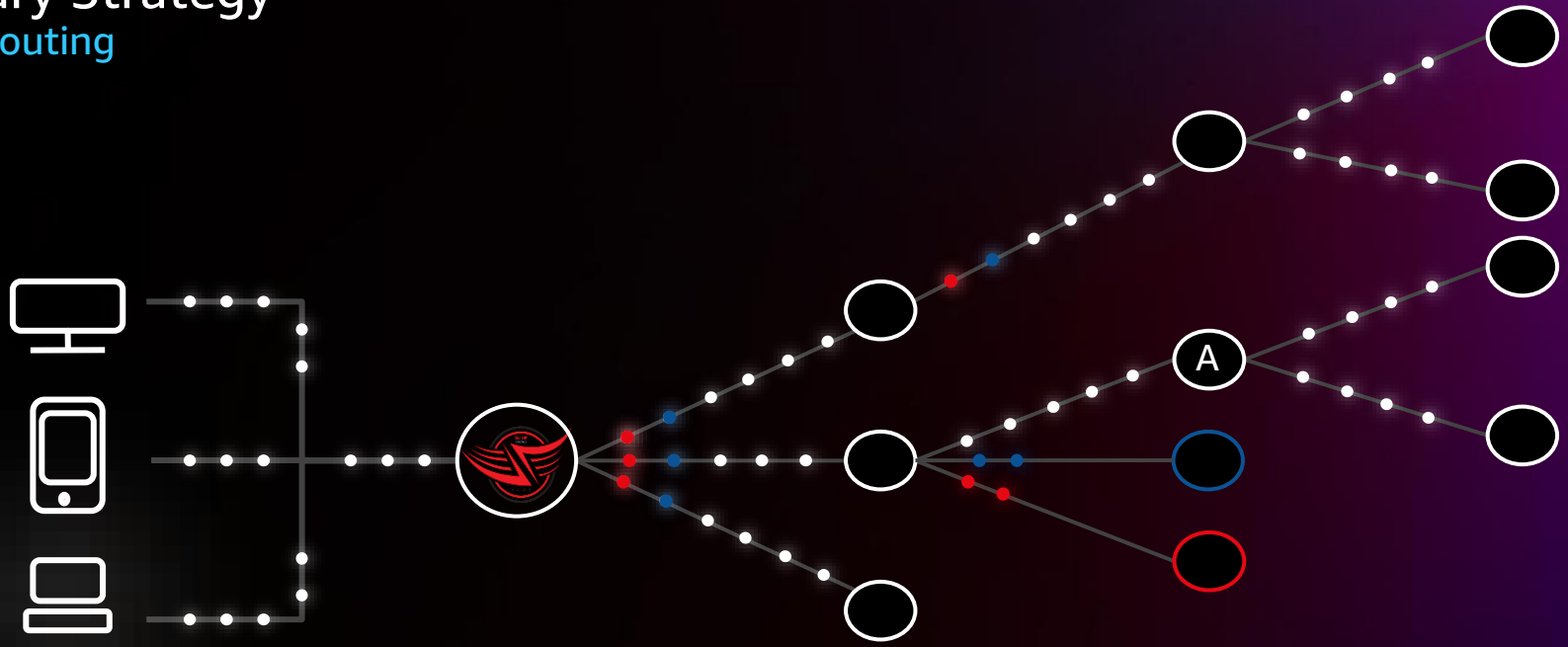
VIP Overrides



aws
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Canary Strategy

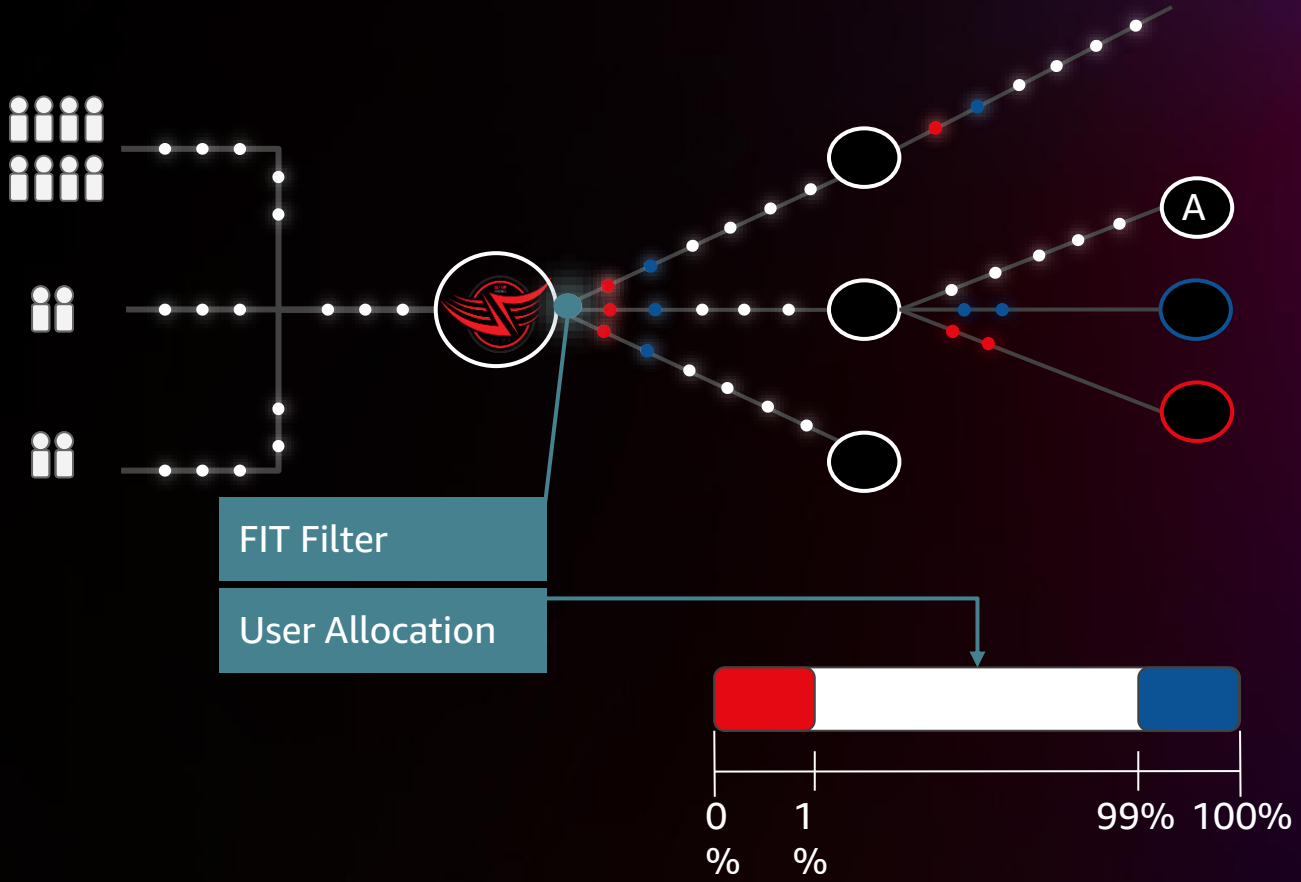
CRR Routing



aws

© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

User Allocation



© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

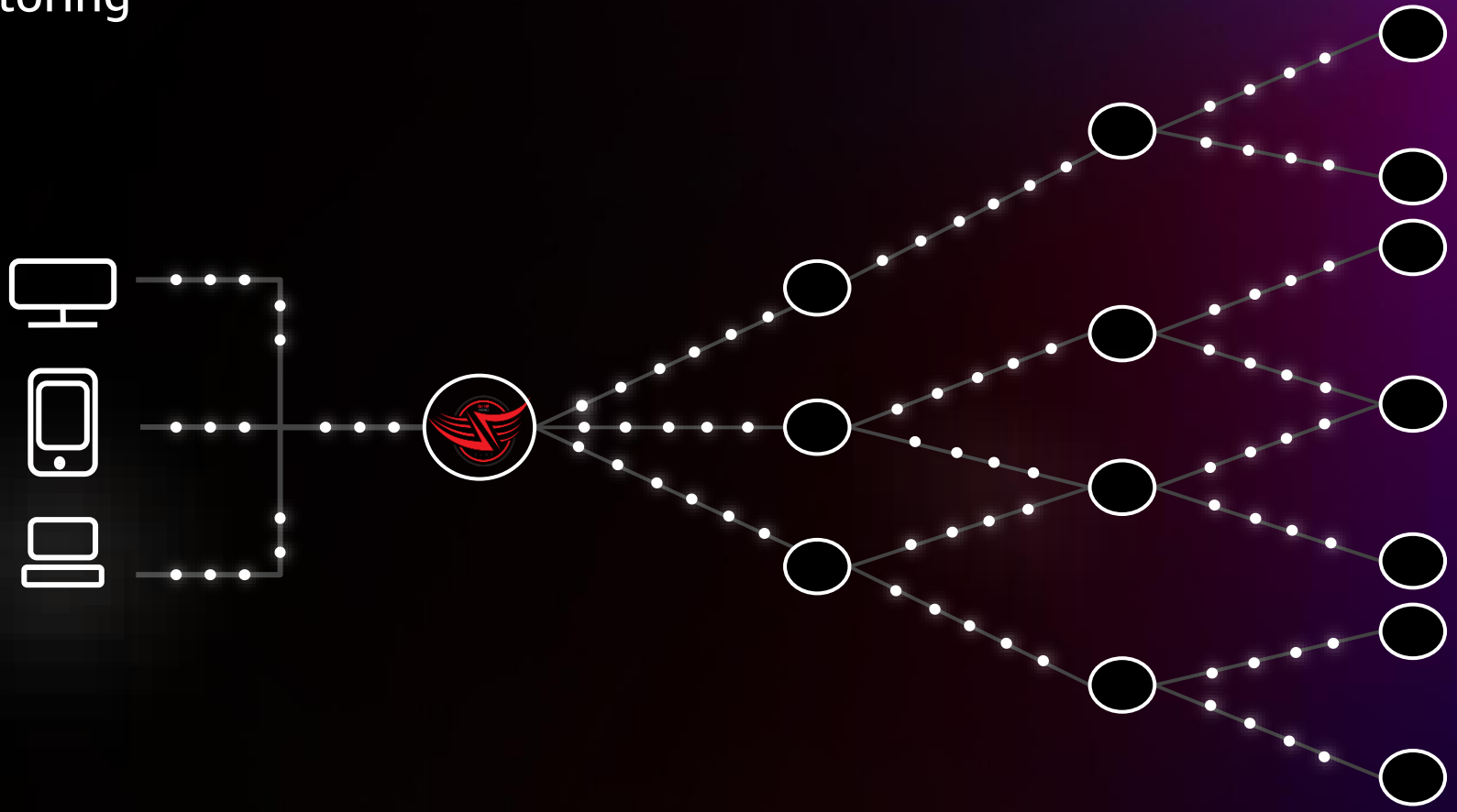


© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.



© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Monitoring



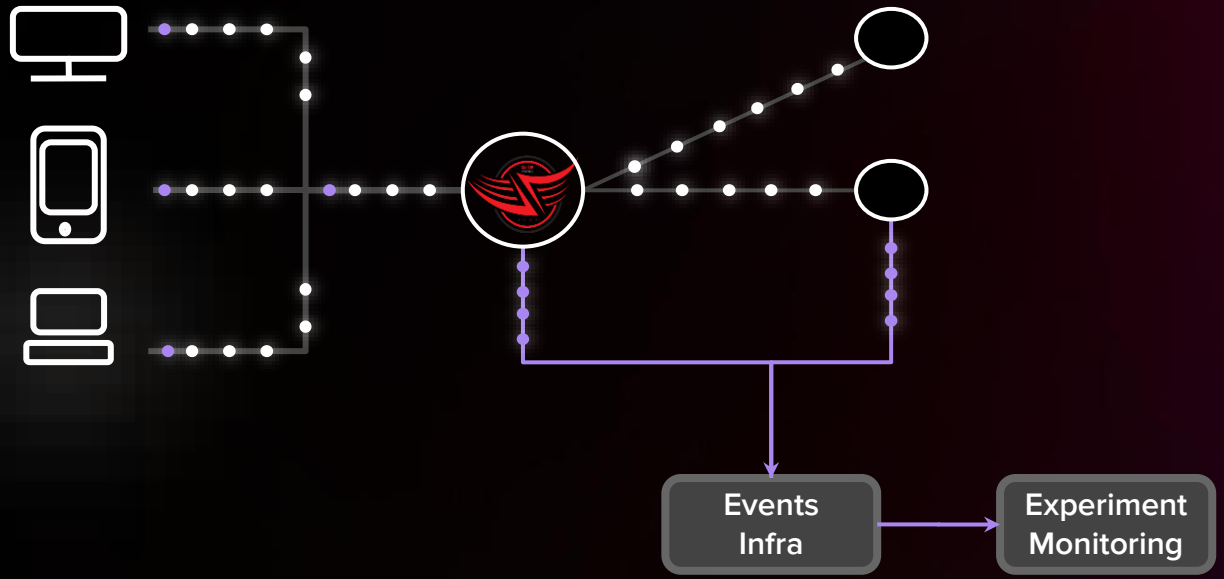
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Monitoring



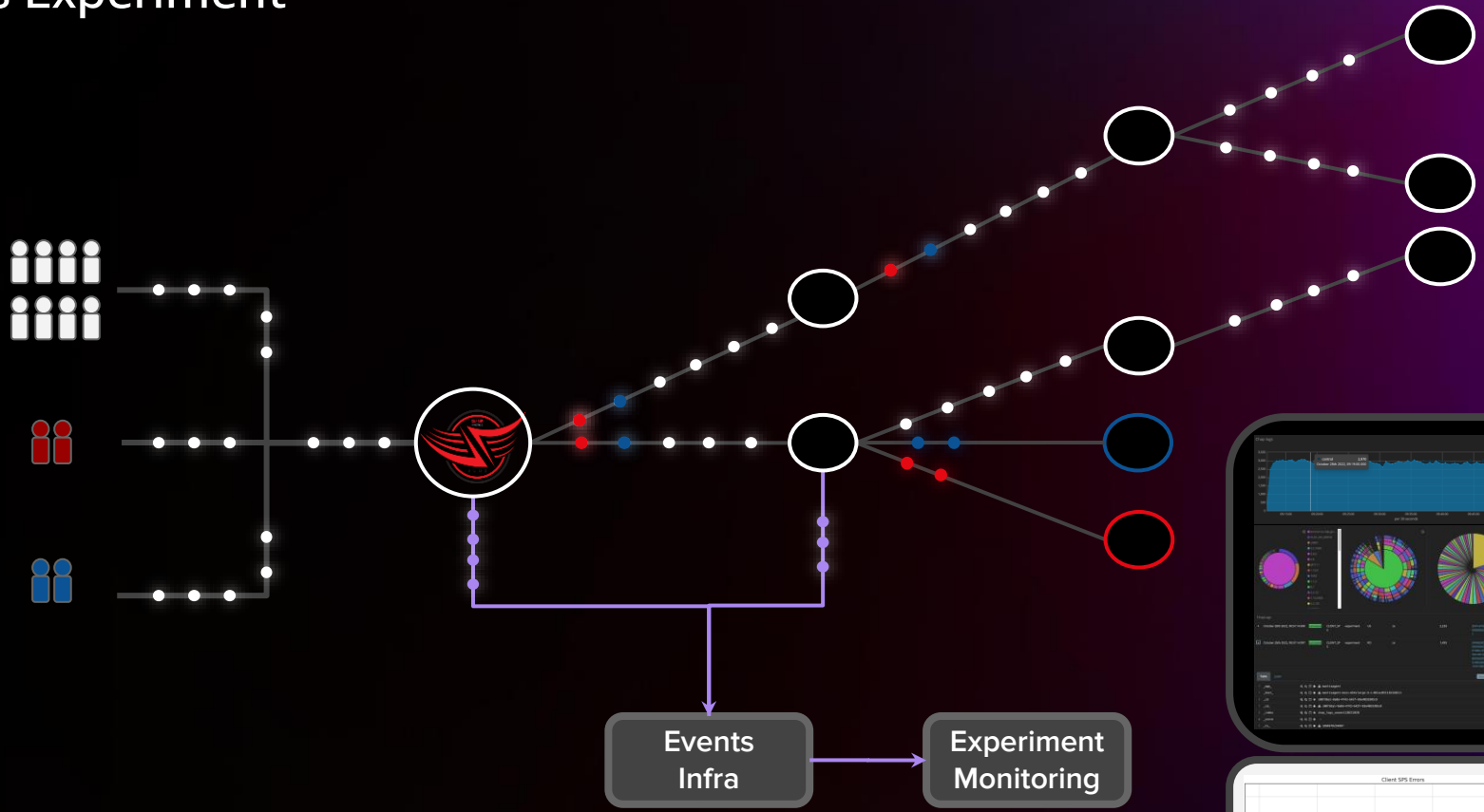
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Monitoring



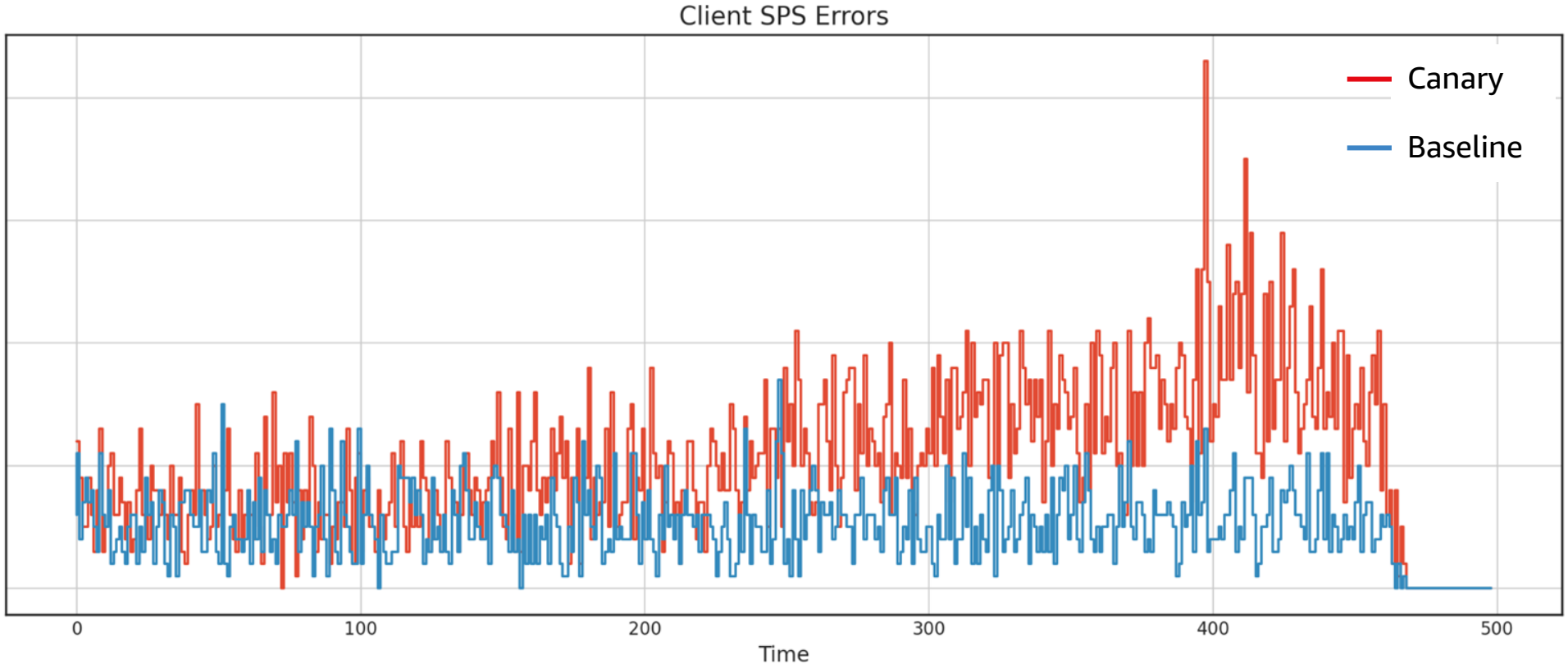
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Chaos Experiment

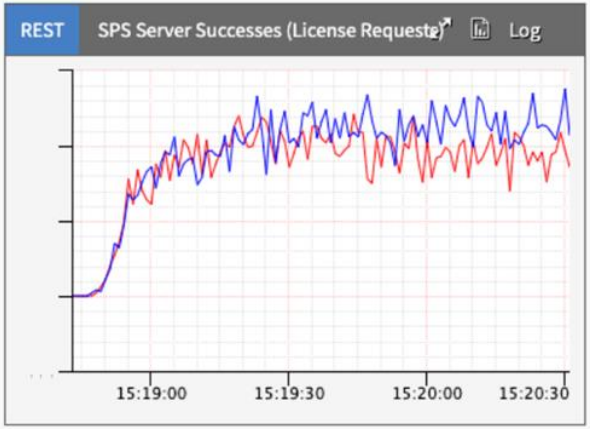


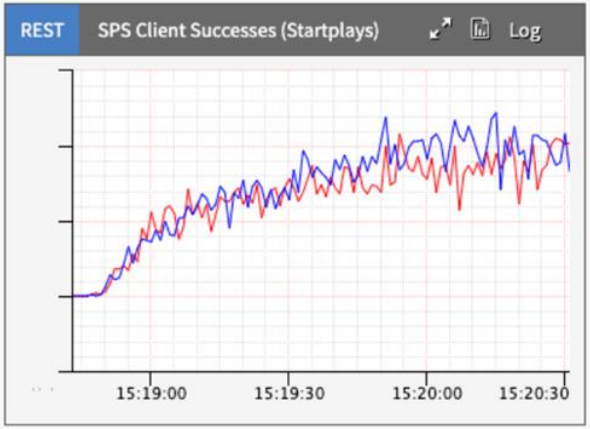
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

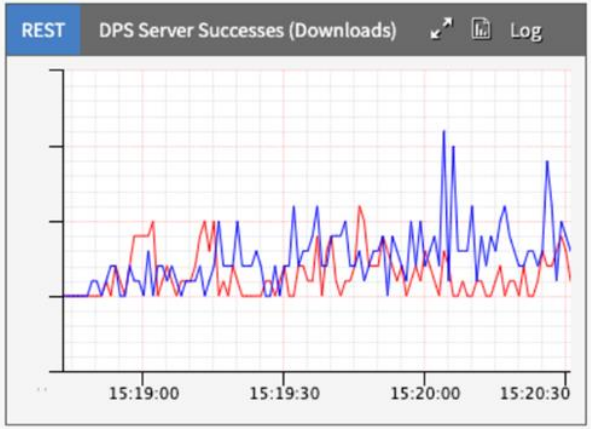
Monitoring

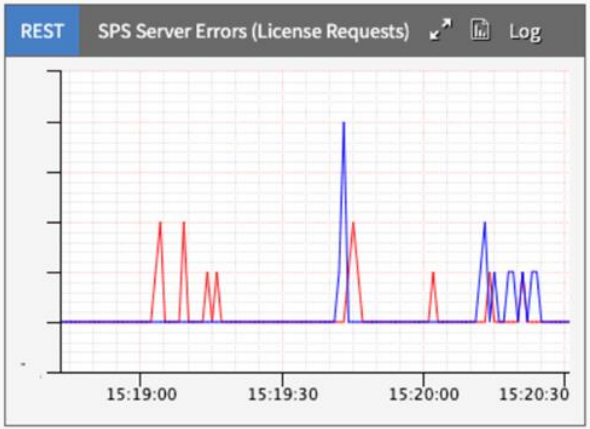


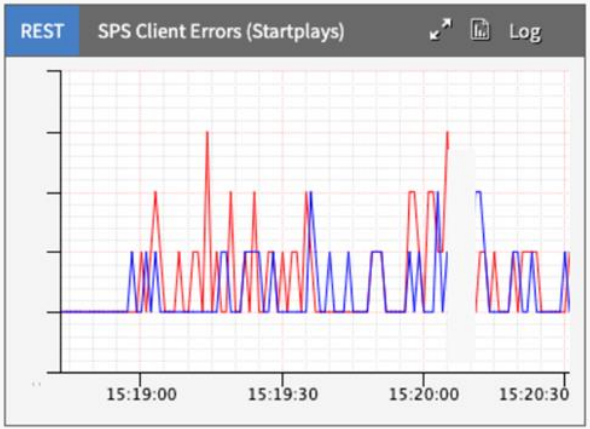
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

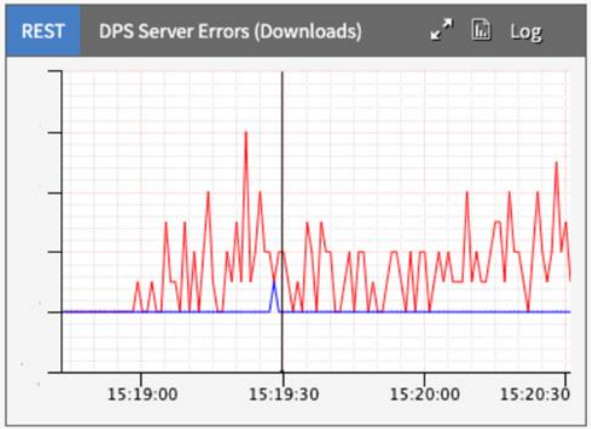










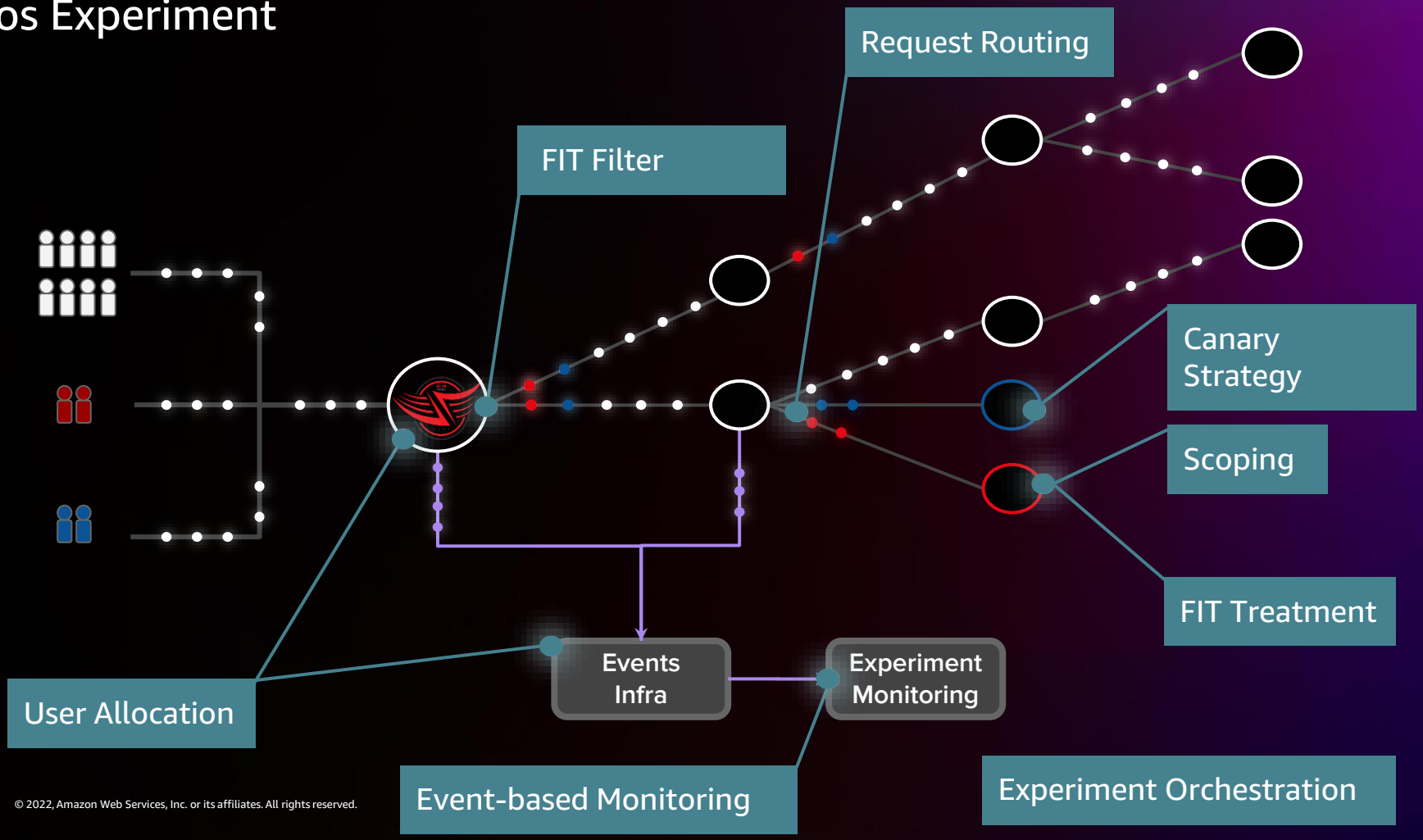


© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

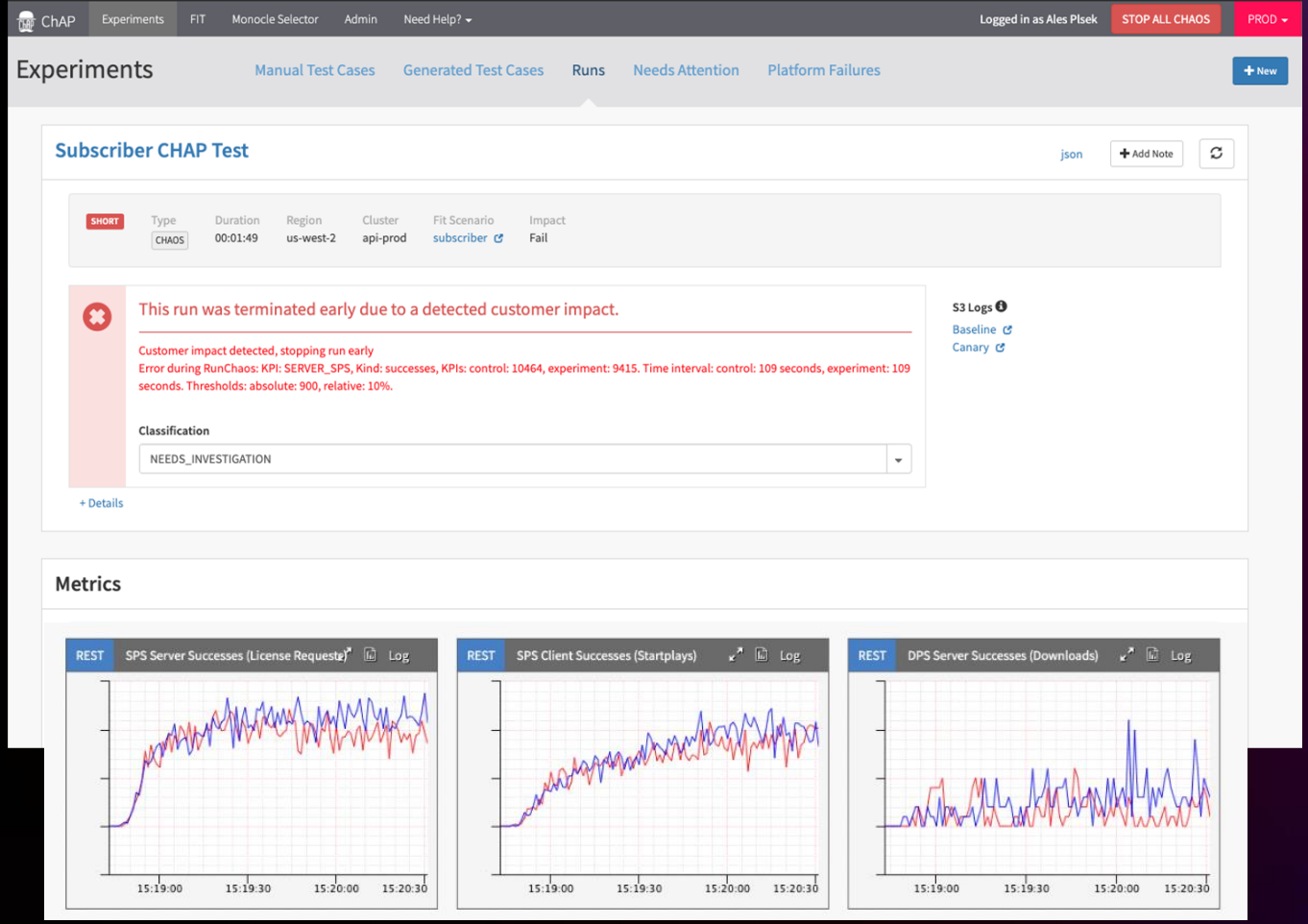


© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

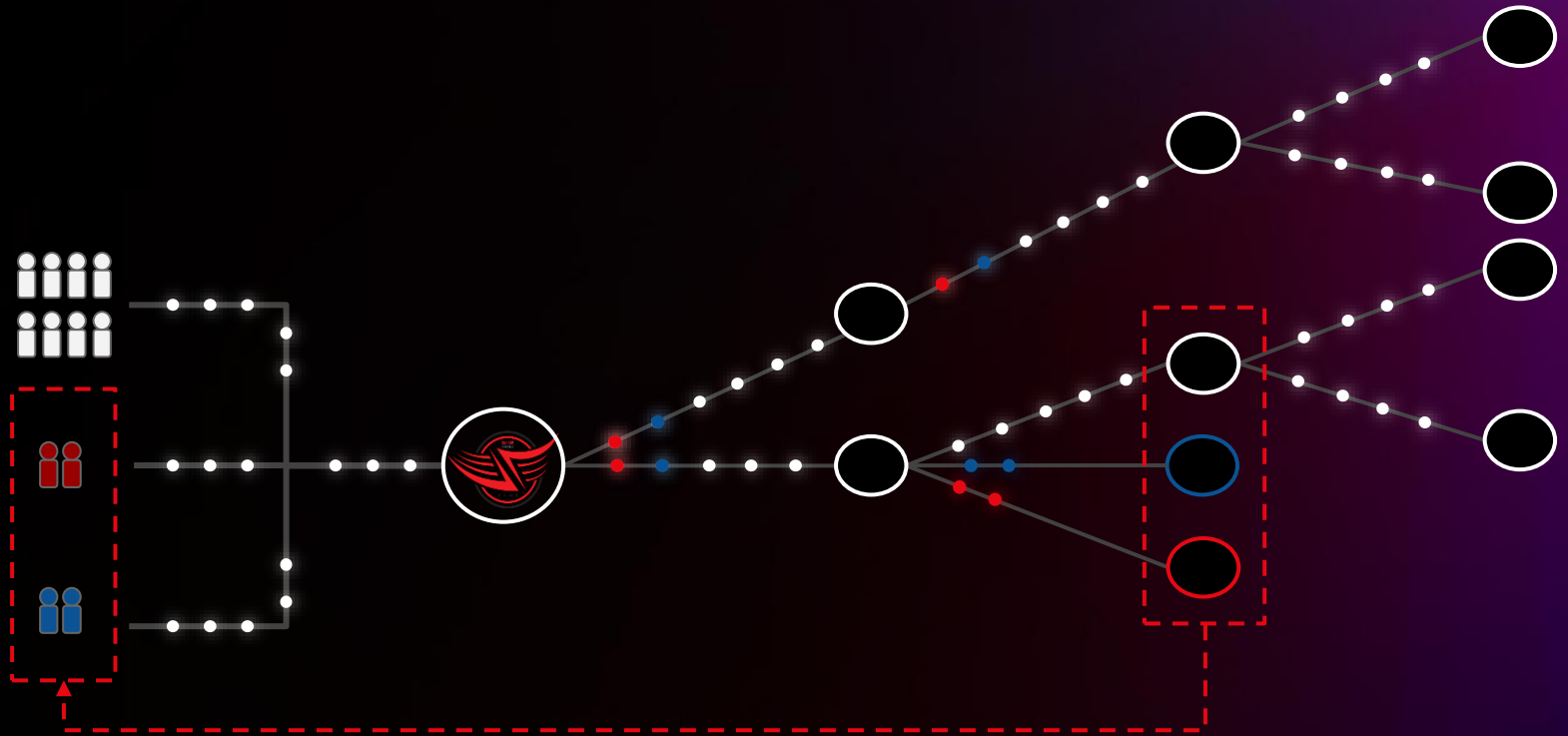
Chaos Experiment

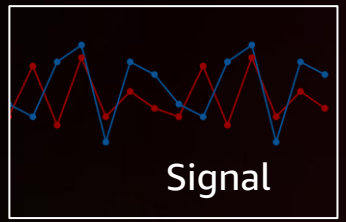


© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.



© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.





aws
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Sticky Canary

"A Sticky Canary is the only way to make sure there is absolutely no customer impact for a given change."

Javier Fernandez-Ivern
Netflix engineer

© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

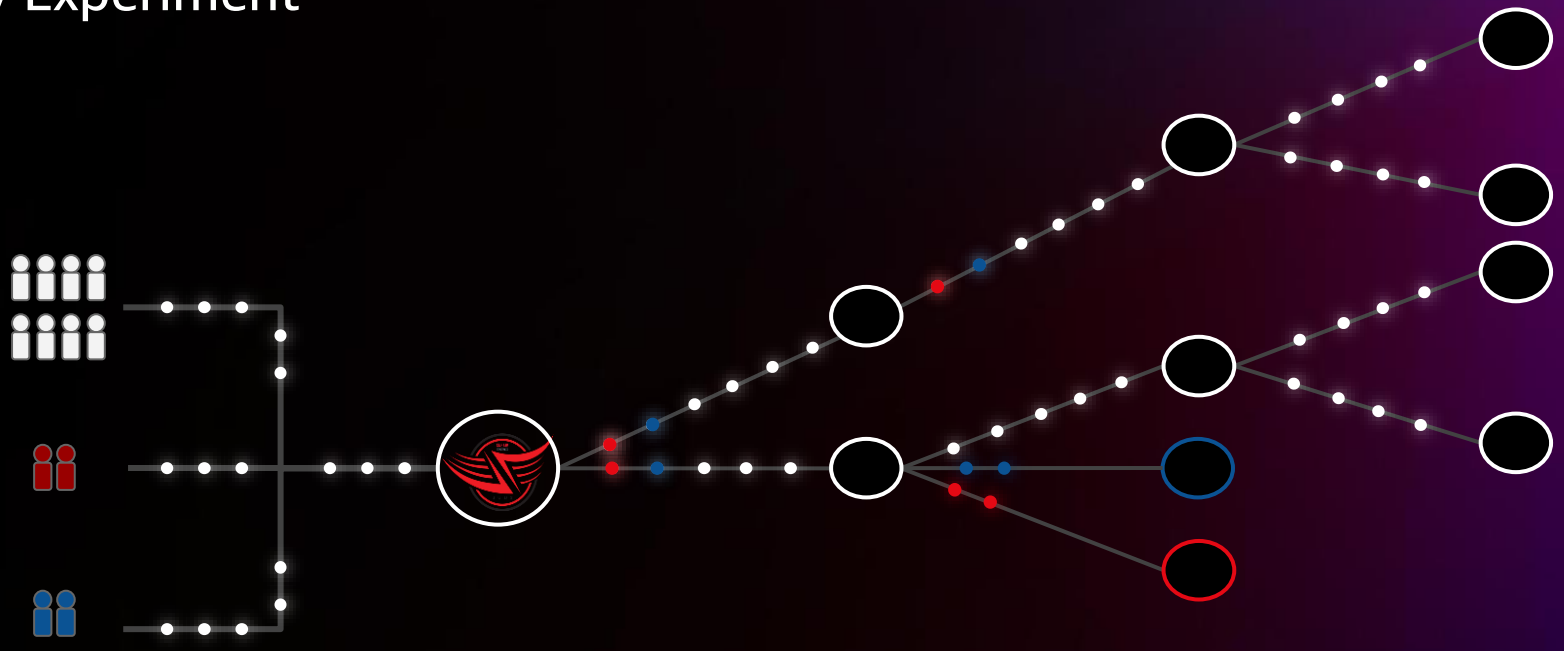
Chaos is dead.
Long live…



© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.


Infrastructure Experimentation

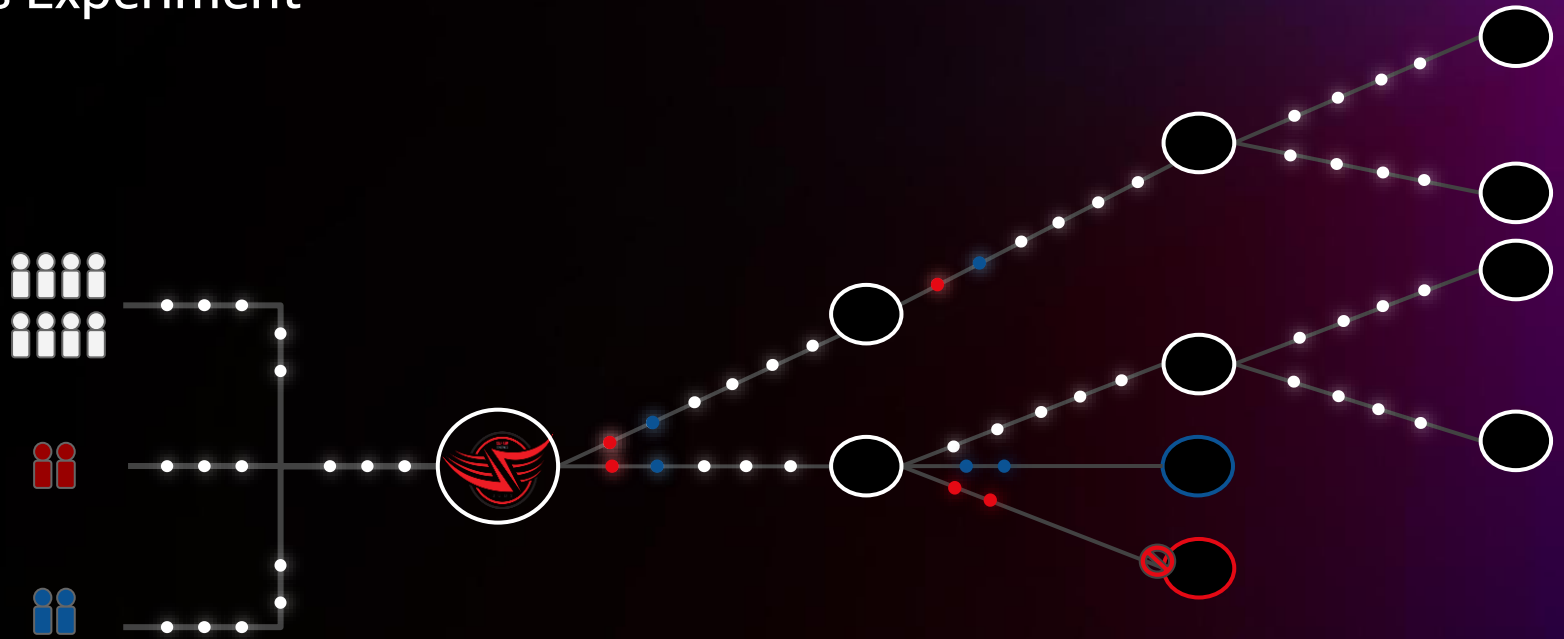
Sticky Experiment



Scope	Request	Cluster
Treatment	Change	

© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

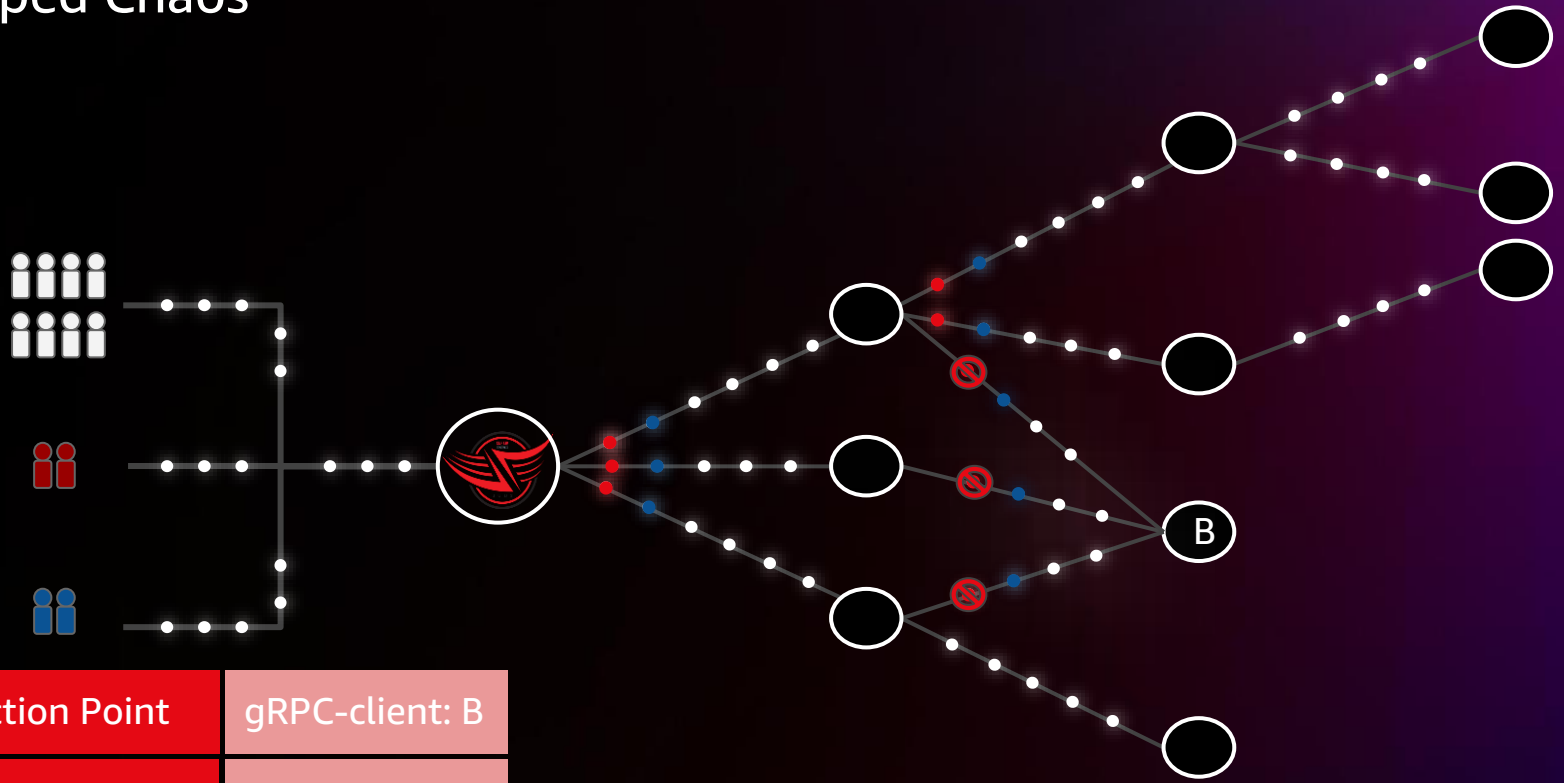
Chaos Experiment



Scope	Request	Cluster
Treatment	Failure	

© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

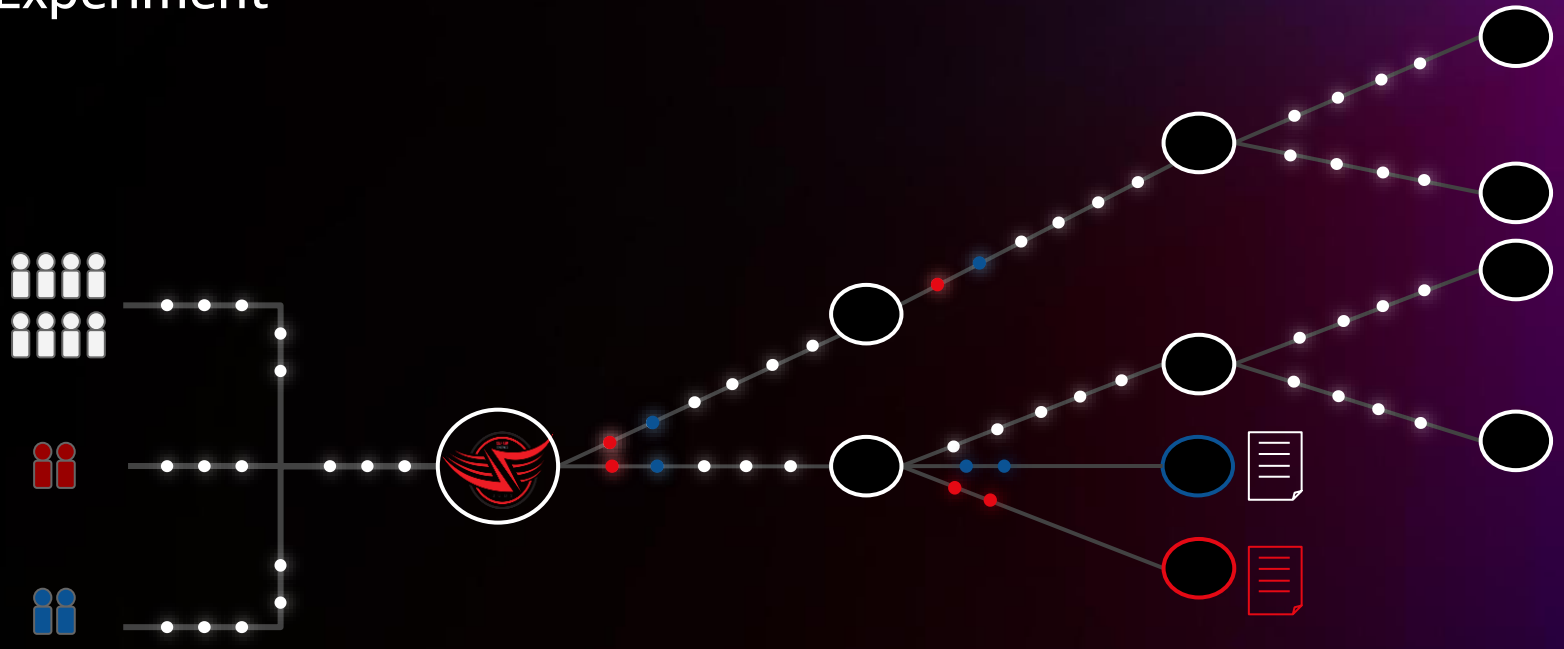
Unscoped Chaos



Injection Point	gRPC-client: B
Scope	Request
Treatment	Failure

aws
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Data Experiment

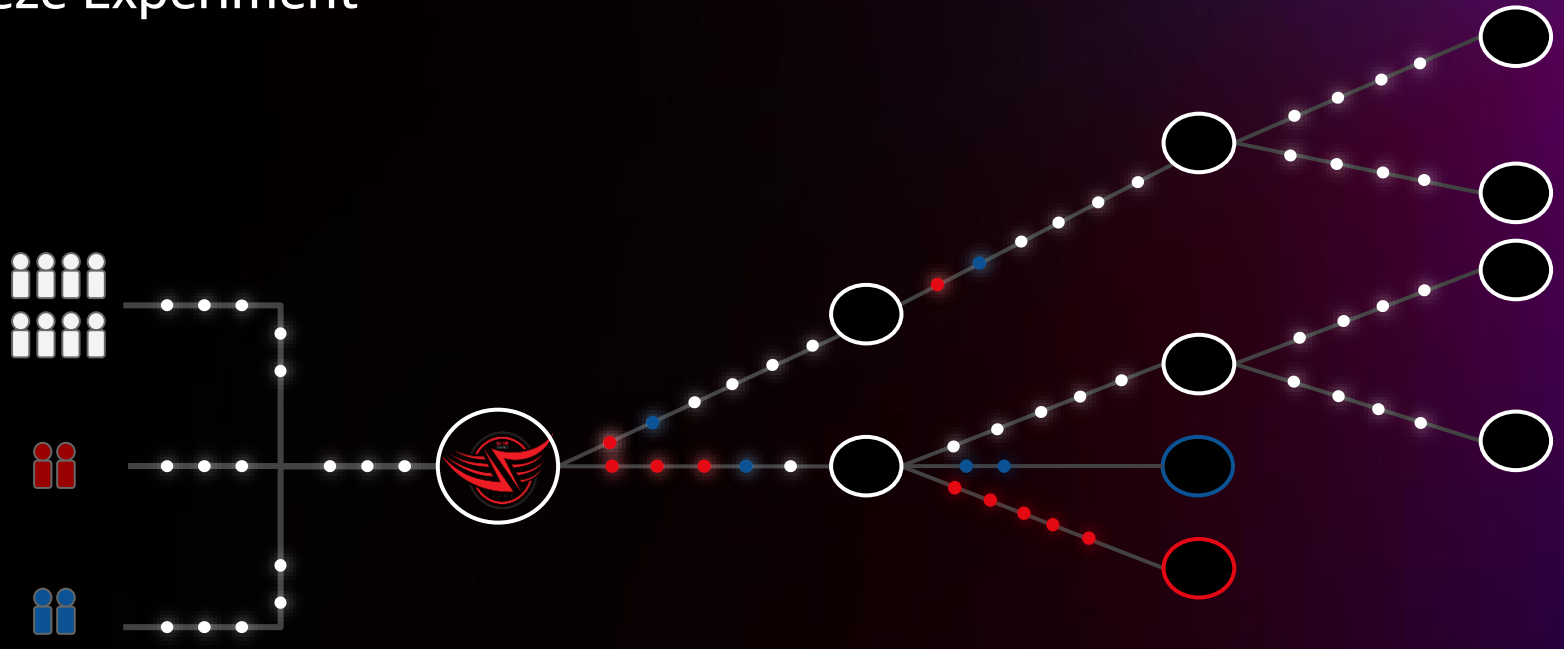


Treatment | Data

aws

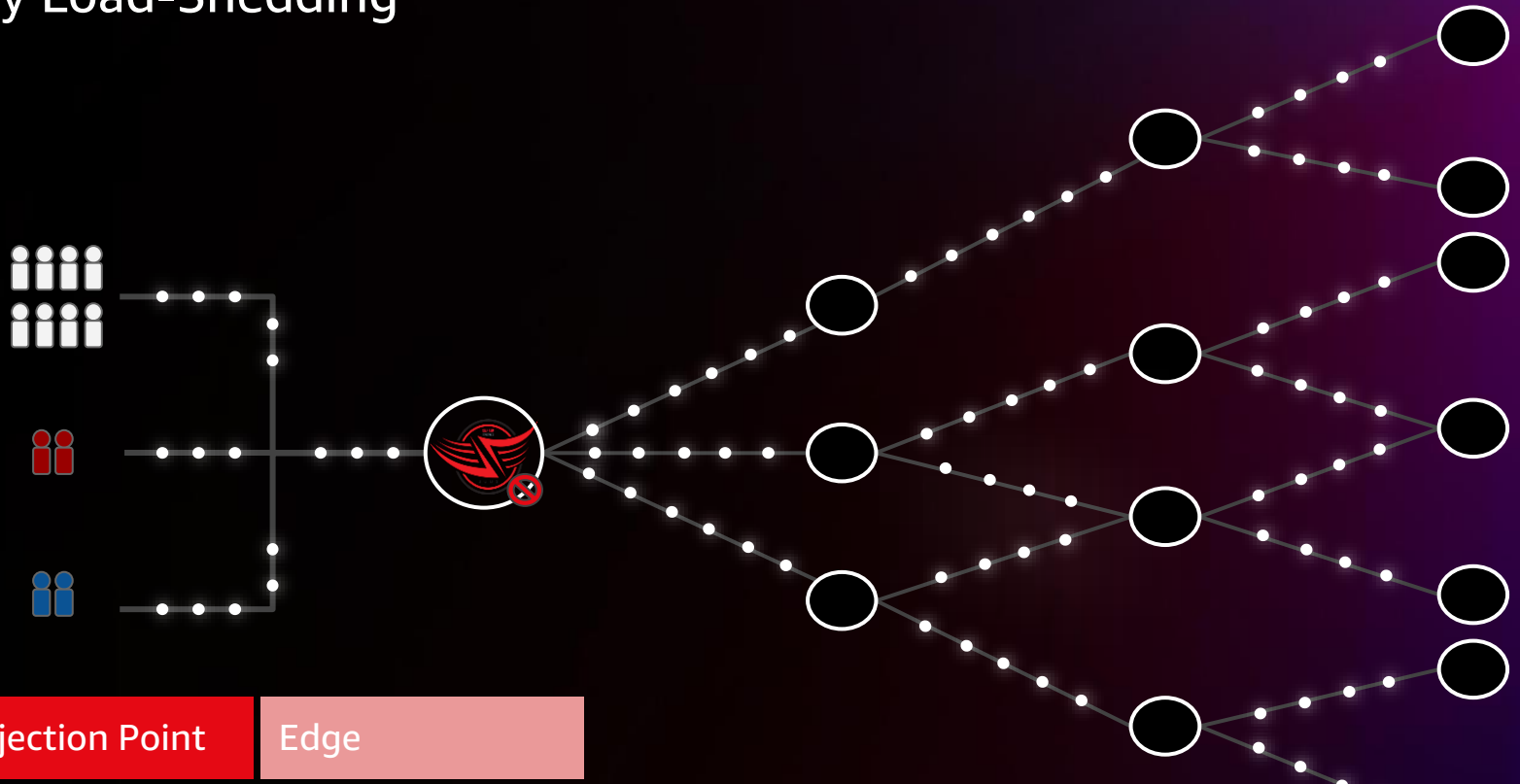
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Squeeze Experiment

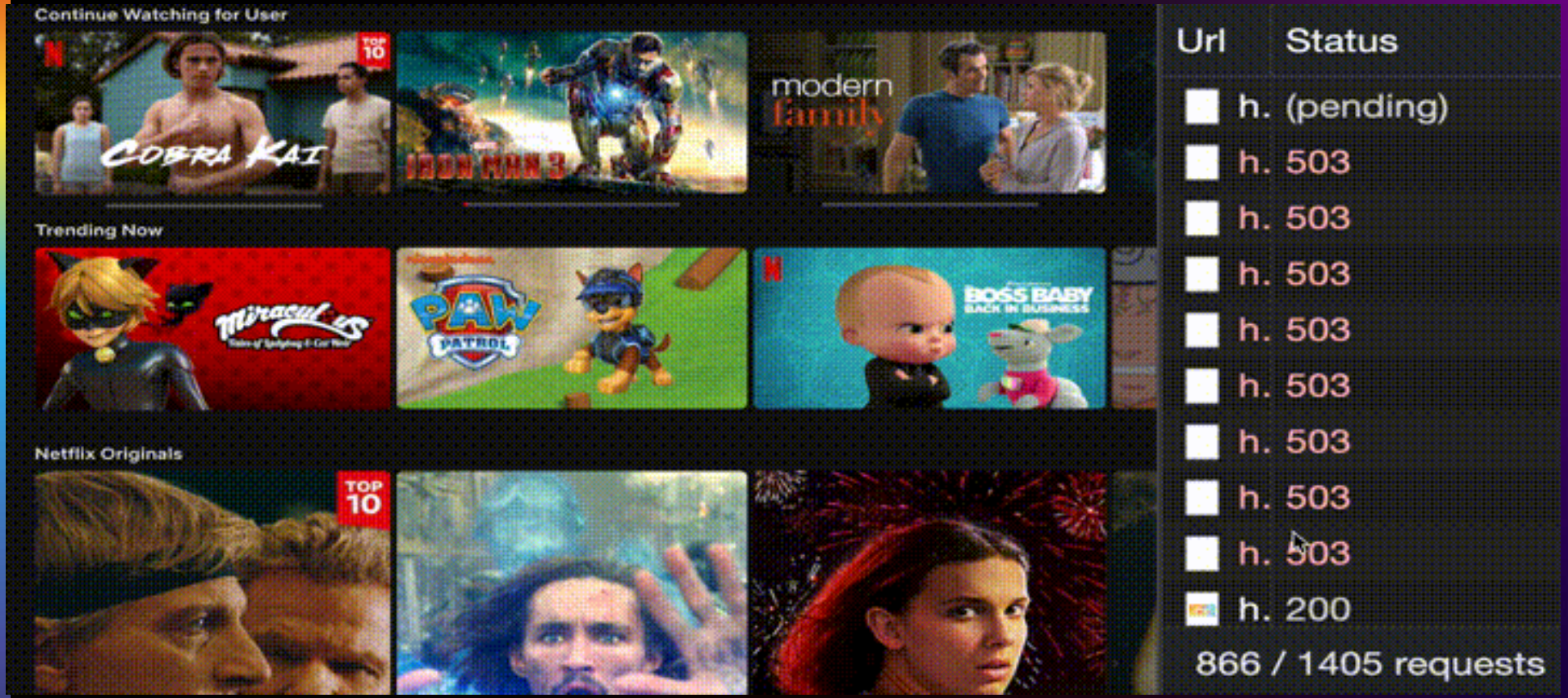


© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Priority Load-Shedding

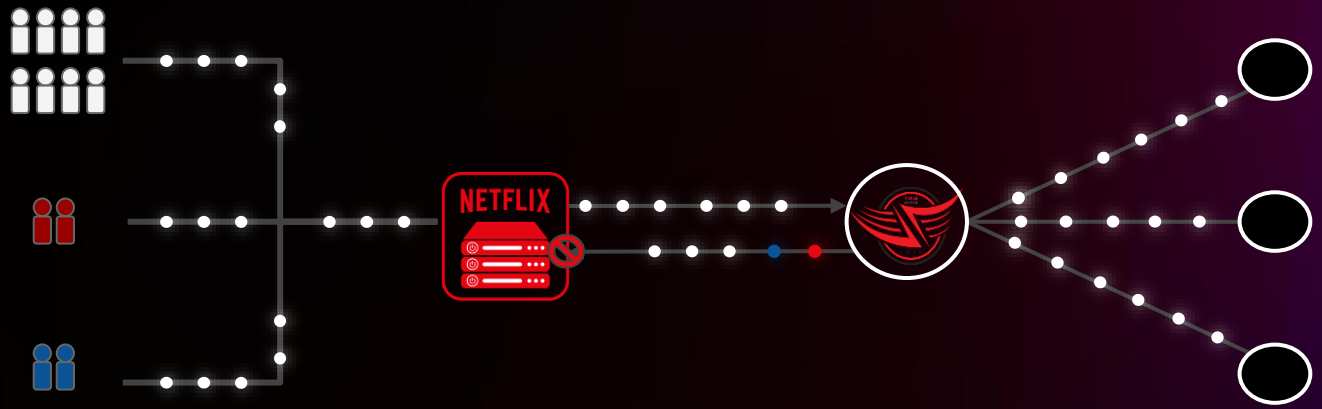


aws
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.



© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

OCA Chaos



Injection Point | OCA

© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

	Treatment	Allocation	Scope
Canary	change	N/A	cluster
Sticky Canary	change	sticky	cluster
Chaos	failure	sticky	cluster
Unscoped Chaos	failure	sticky	N/A
Data Canary	data	sticky	N/A
Squeeze	N/A	non-sticky	cluster
OCA Chaos	failure	sticky	N/A
LoadShedding	failure	sticky	N/A

aws
© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Building Chaos

Evolving Chaos Engineering in Your Organization

Chaos Monkey
- ChaosMonkey OOS, Kubernetes, AWS Fault Injection Simulator

Canaries
- Spinnaker + Kayenta

Tracing
- Zipkin, CRR propagation

Fault Injection
- Service Mesh, Envoy
- Spring Boot Fallbacks

aws

© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.


OCA Chaos
Priority Load-Shedding
Data Canary
Unscoped Chaos
Squeeze
Canary
Change Experiment
Chaos


NETFLIX

Moments of Joy



Thank you!



Thank you!





Questions?



Questions?

Thank you!



Please complete the session survey in the mobile app

© 2022, Amazon Web Services, Inc. or its affiliates. All rights reserved.