
AWS
re:Invent
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DOP313

# Chaos engineering with AWS Fault Injection Simulator


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# Agenda

Chaos engineering: Motivation (business and tech)

Chaos engineering: Process

AWS Fault Injection Simulator (FIS): Introduction

Builder session: Hands-on with FIS

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# Motivation for chaos engineering: Resilience



**Technical view**

- Don’t like waking up at night
- Keep management happy



**Business view**

- Save by preventing outages
- Keep customer happy

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# Business impact of (non)-resilience

**$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)



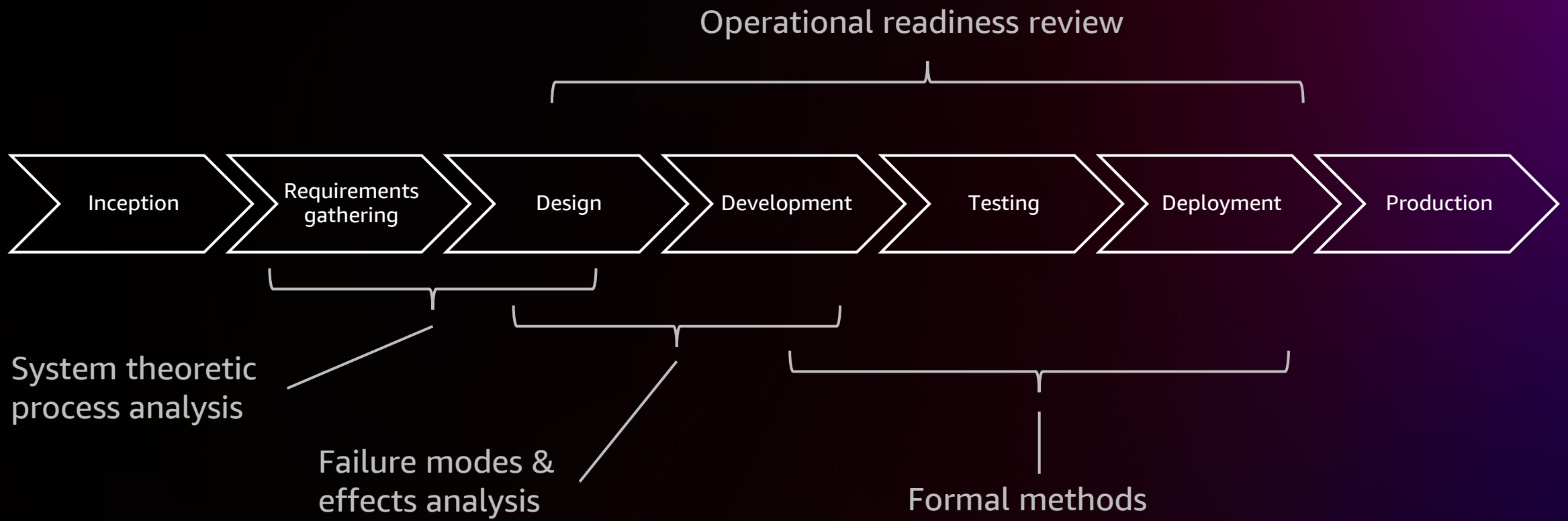
**Cost savings of 15%–25%**

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

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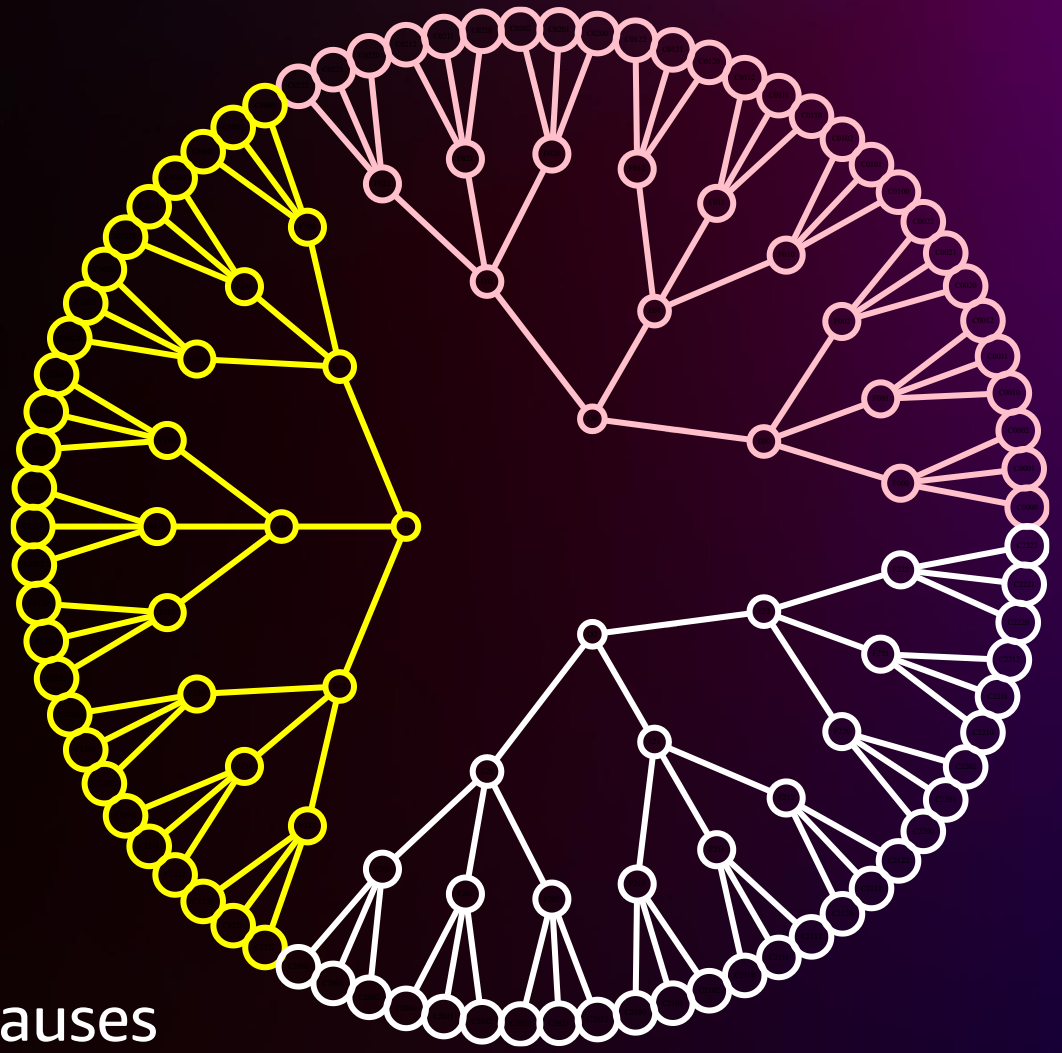
# Reasoning over failure causes




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# What to test: Cause and effect

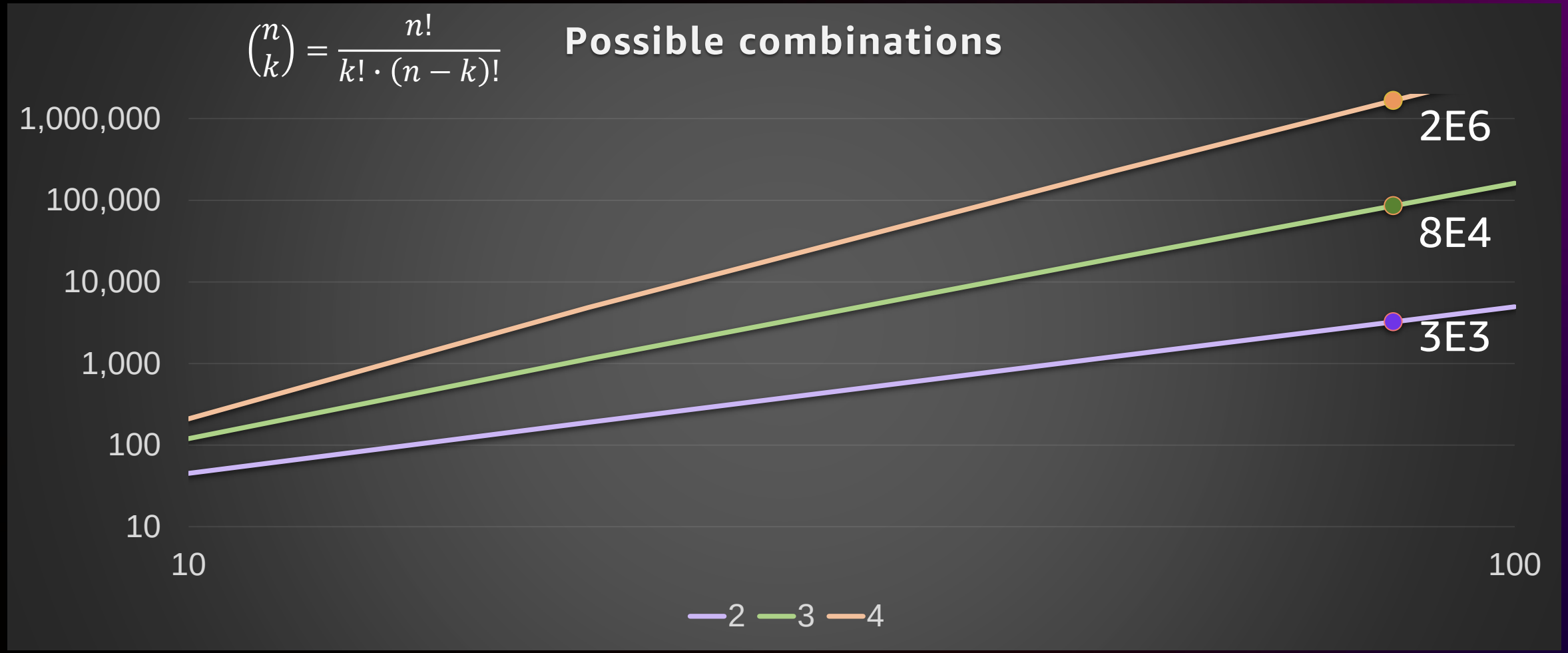
- Possible negative business outcome
- Possible events causing outcome
- Possible failures causing event
- Possible causes for events



Simple system example, 3 outcomes, 81 causes

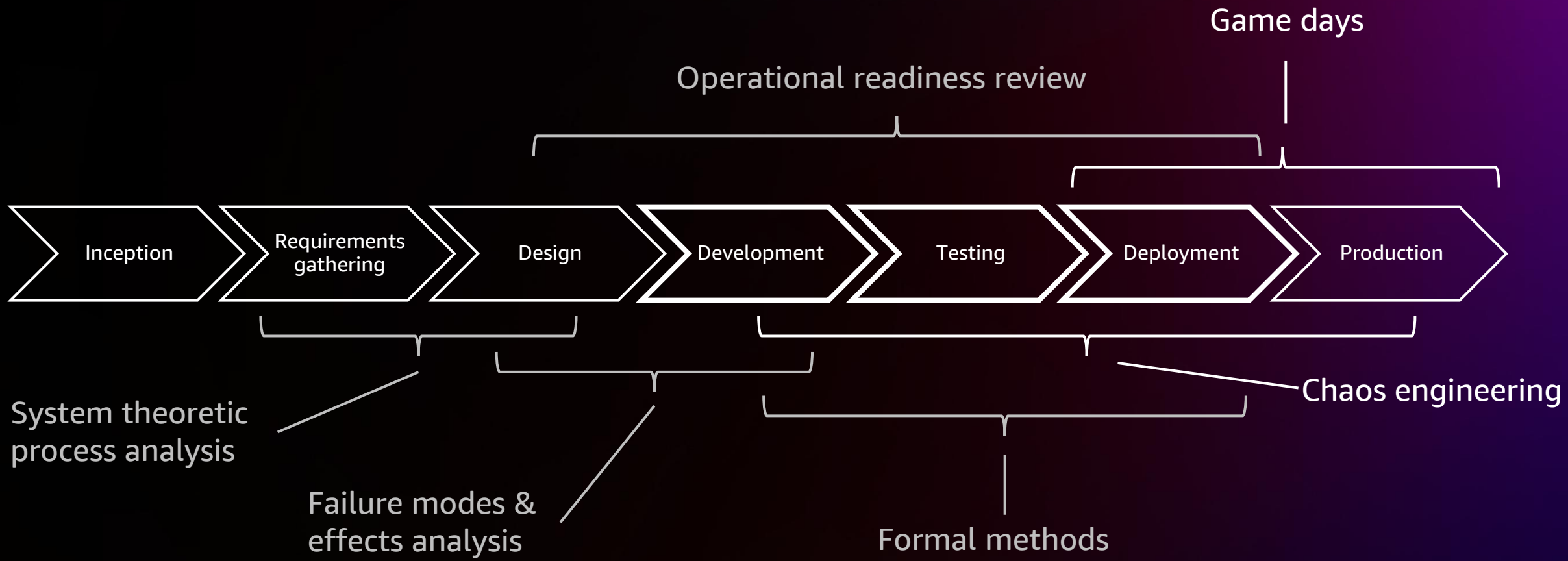
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# Complexity: Failures with more than one cause



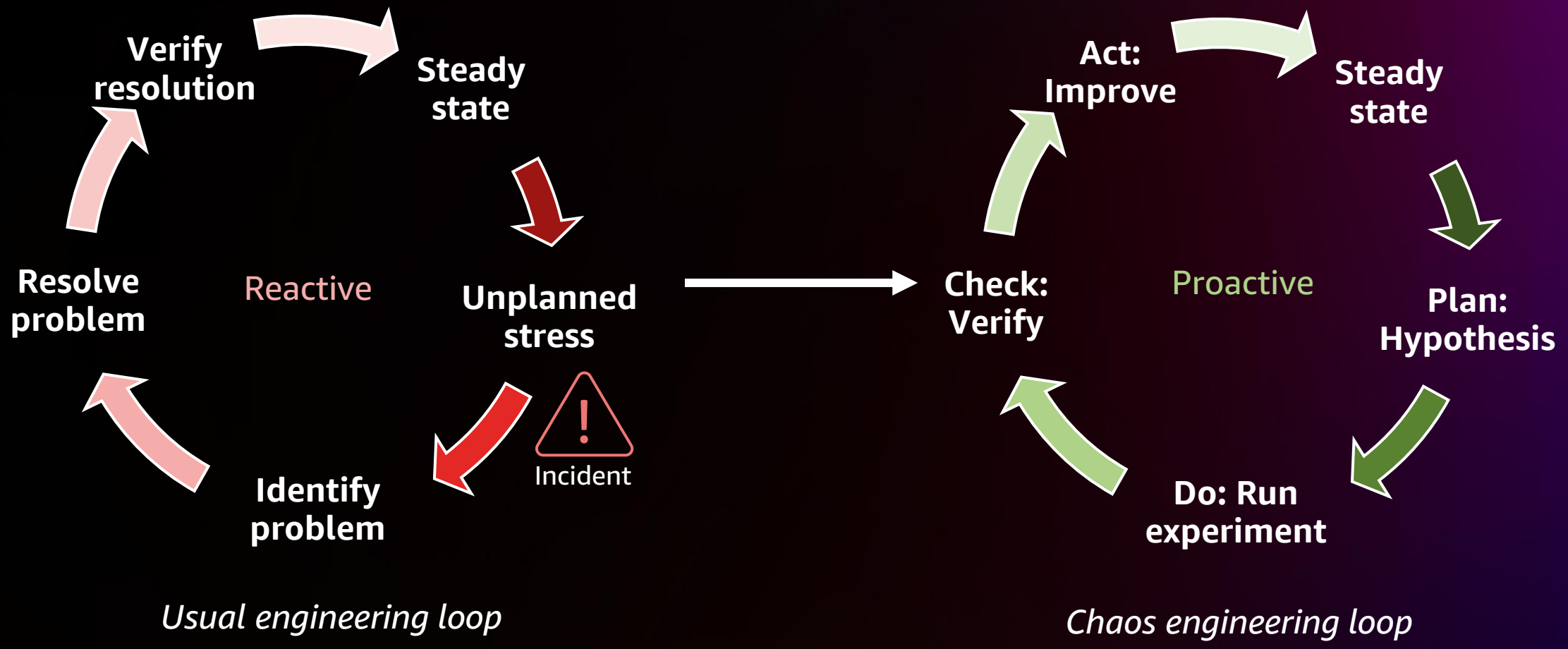

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# Finding failures in deployed systems




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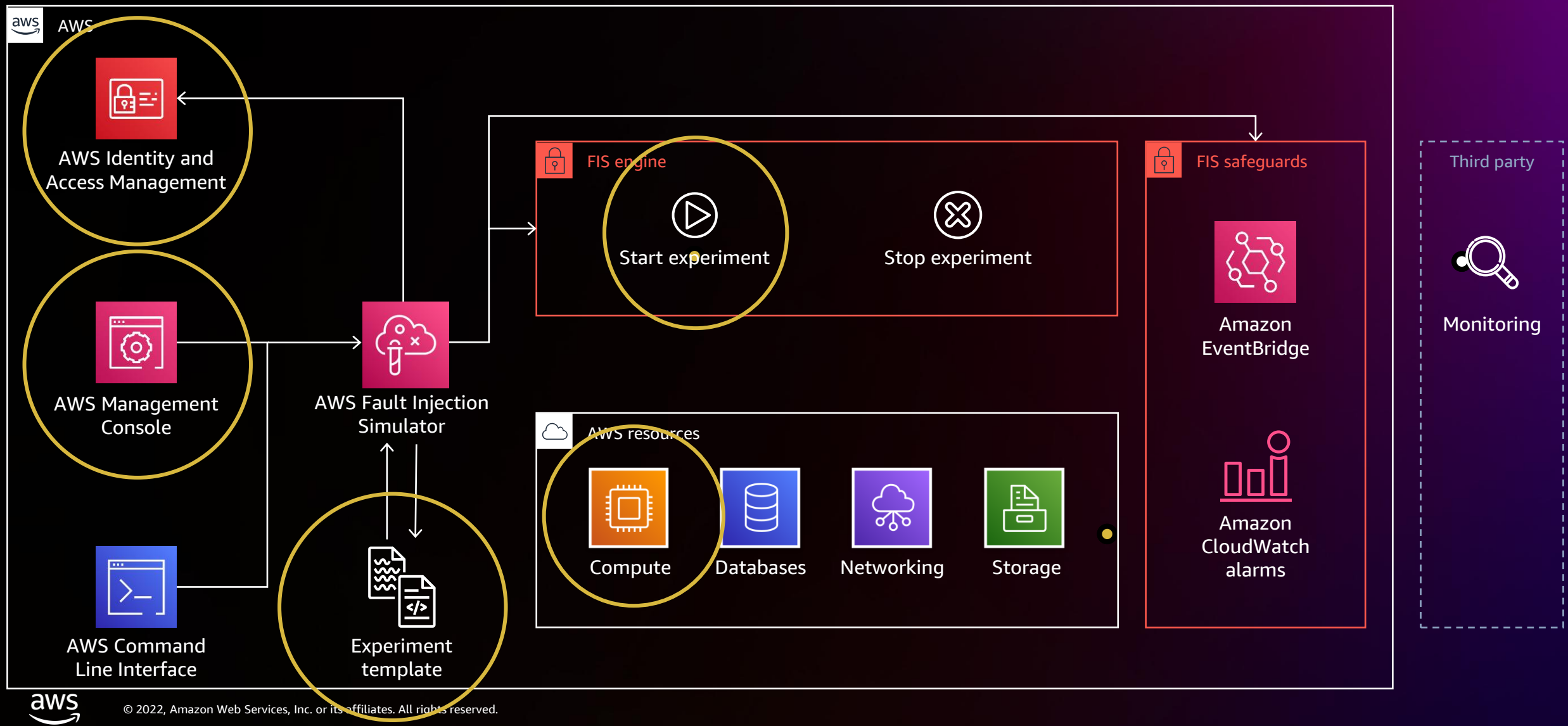
# Improving resilience




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# AWS Fault Injection Simulator

OVERVIEW



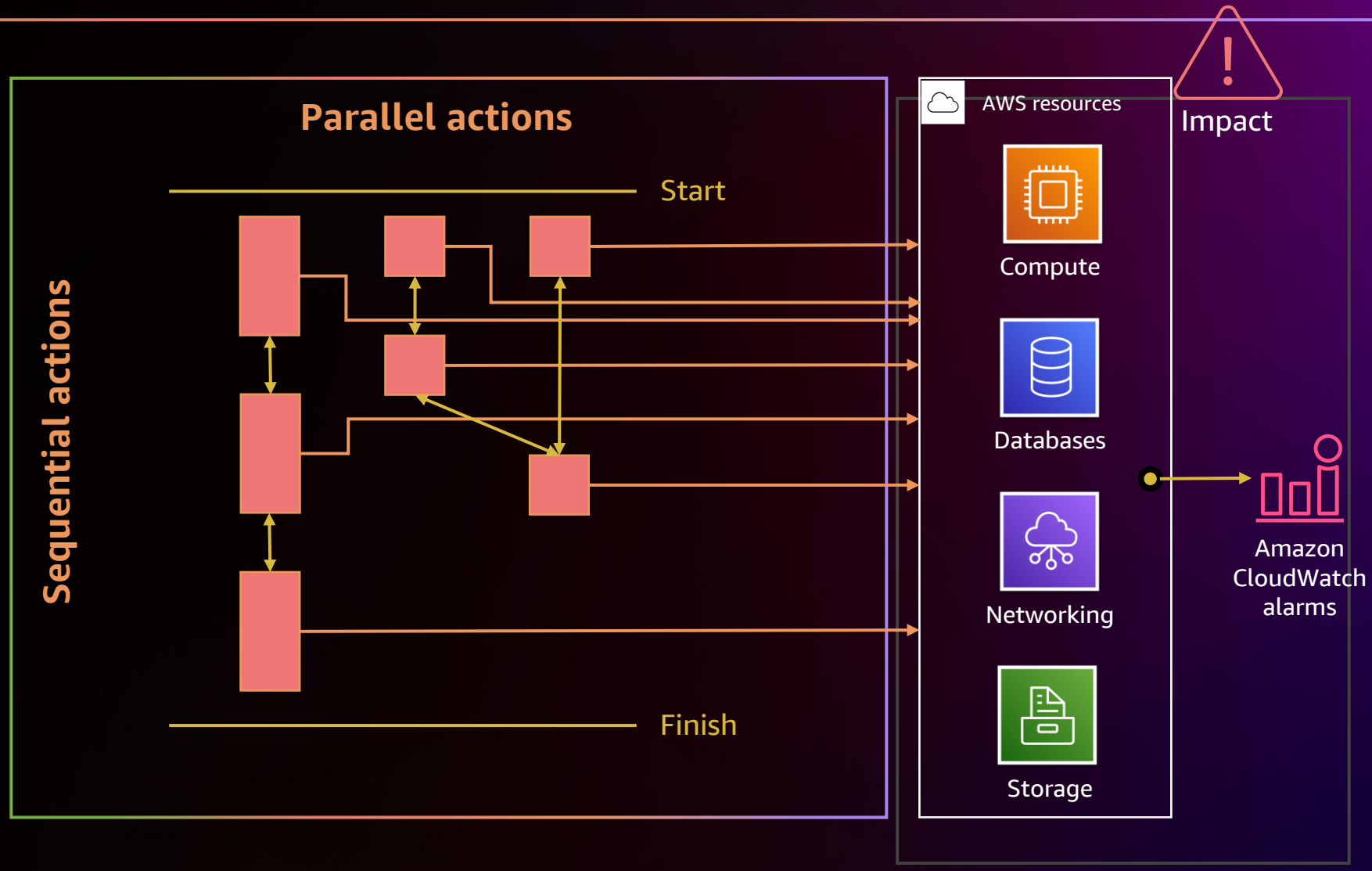

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# Sequencing in FIS experiments

A real world scenario will have many things happening

- in sequence
- in parallel

FIS gives you an ability to orchestrate complex real world conditions in the experiment template.




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# Supported actions

API faults [throttling | internal error | unavailable error] (EC2)

Amazon EC2 instance actions [stop | reboot | terminate]

EC2 Spot Instance interruption

ECS [drain container instances, stop task]

Amazon EKS [terminate node group instances, chaos custom actions]

Amazon RDS database [stop | reboot | failover]

Amazon CloudWatch [assert alarm state]

Network disruption

**Systems Manager Run Command [CPU | memory | process | network | … ]**

**Systems Manager Automation**

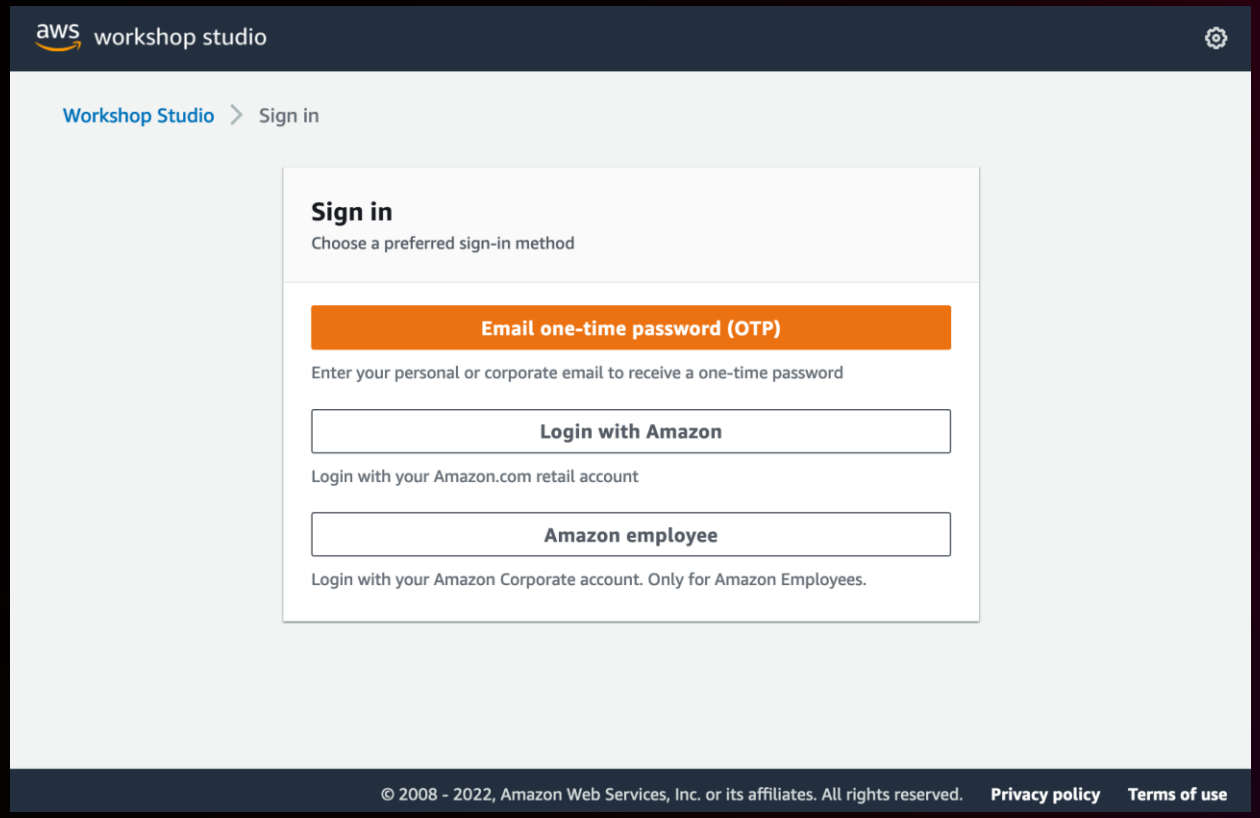
# Getting started with this workshop

- As a participant, you will have access to an AWS account with any optional pre-provisioned infrastructure and IAM policies needed to complete this workshop.
- The AWS account will only be available for the duration of this workshop. You will lose access to the account thereafter.
- The optional pre-provisioned infrastructure will be deployed to a specific region. Check your workshop content to determine whether other regions will be used.
- Be sure to review the terms and conditions of the event. Do not upload any personal or confidential information in the account.

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# Step 1: Sign-In via your preferred method

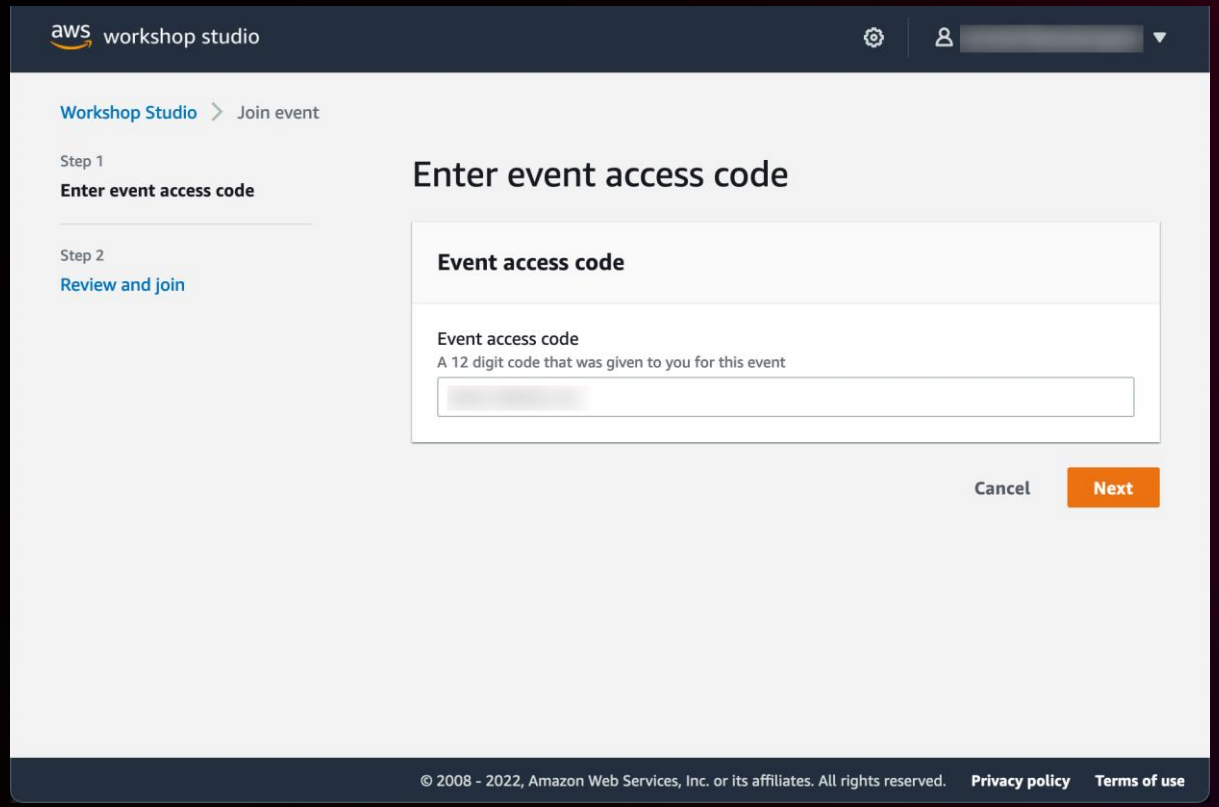
https://s12d.com/dop313-a




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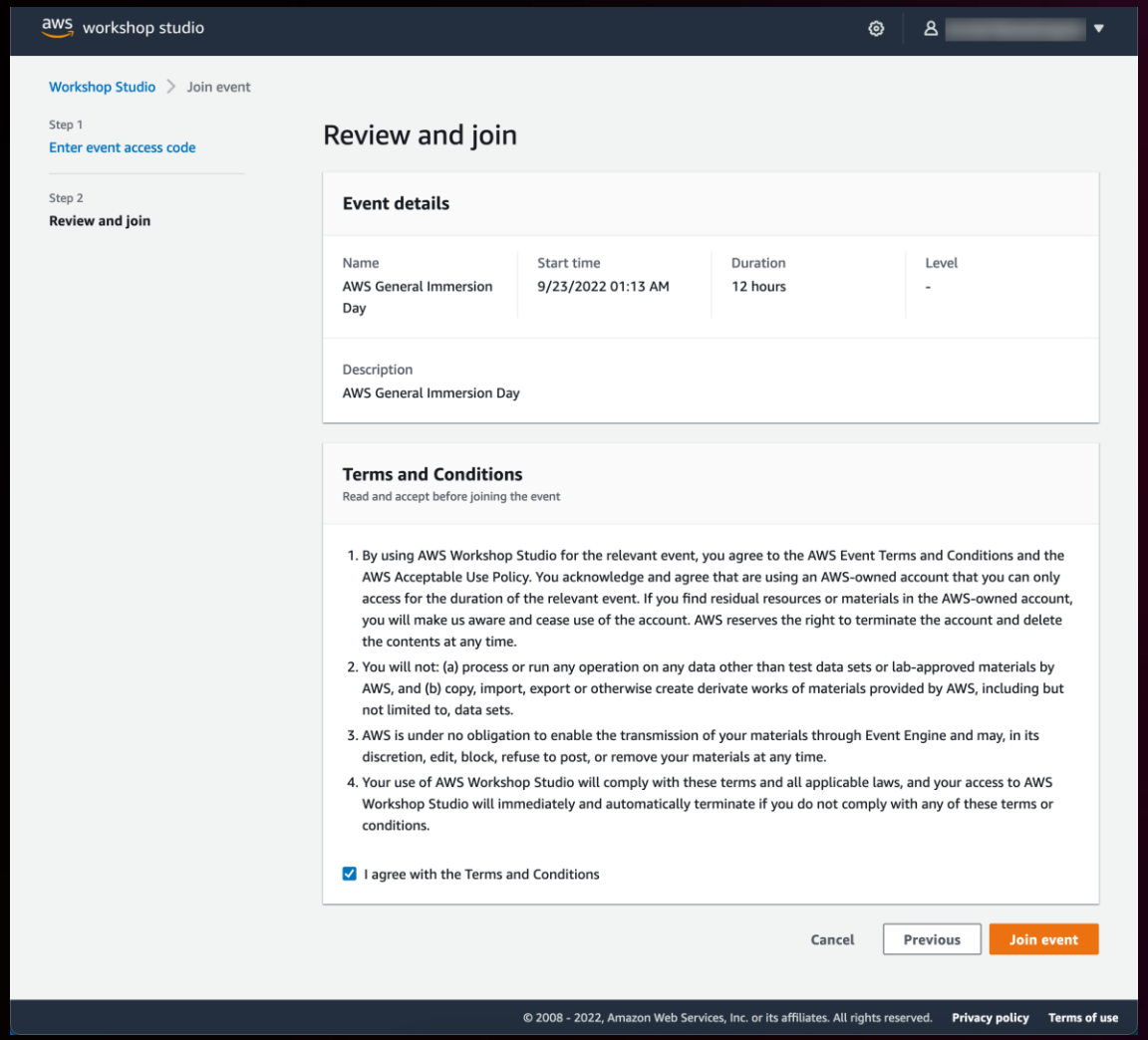
# Step 2: Enter event access code

Enter 12 digit event access code. If you were given a one-click join link, you can skip this step.




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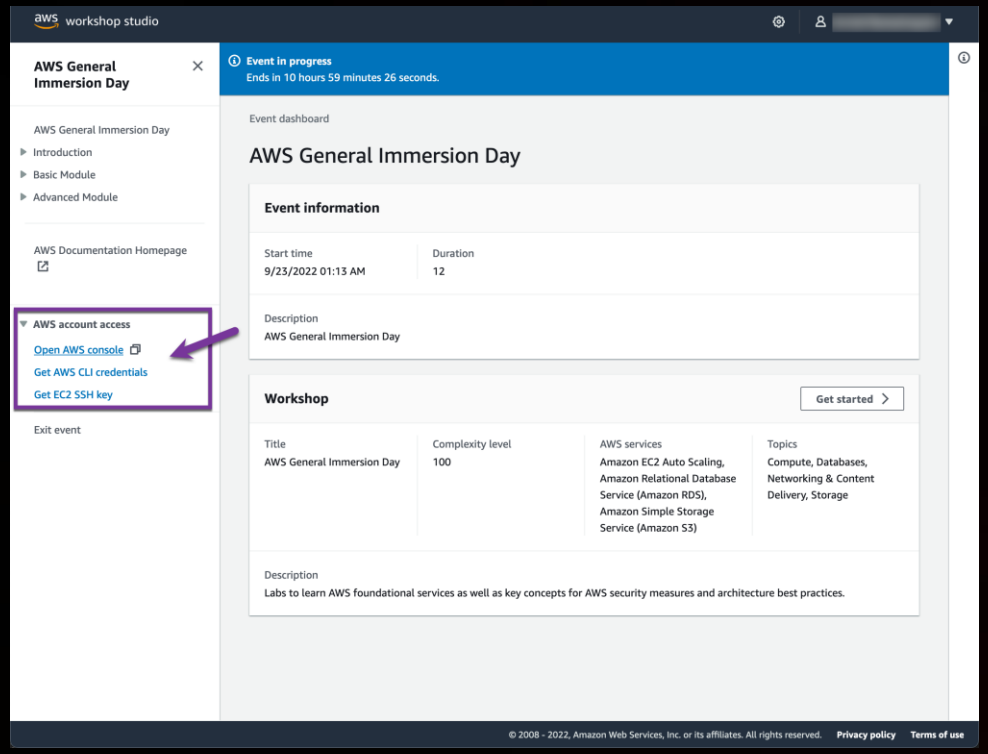
# Step 3: Review terms and join event

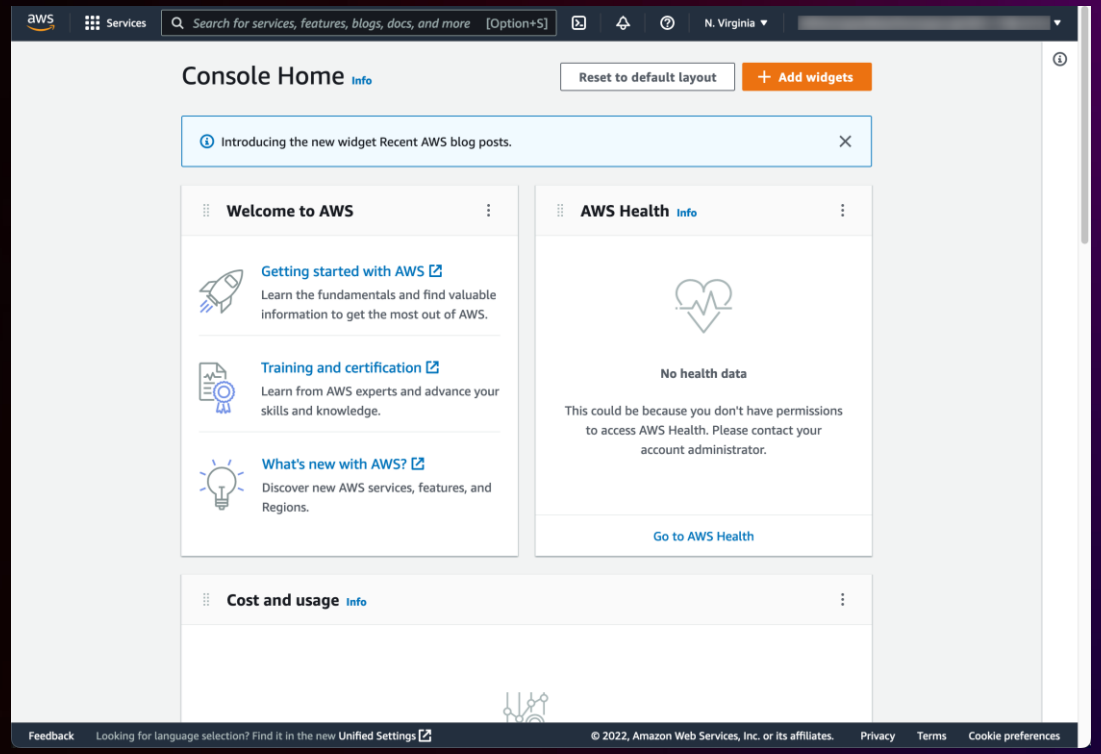



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# Step 4: Access AWS account

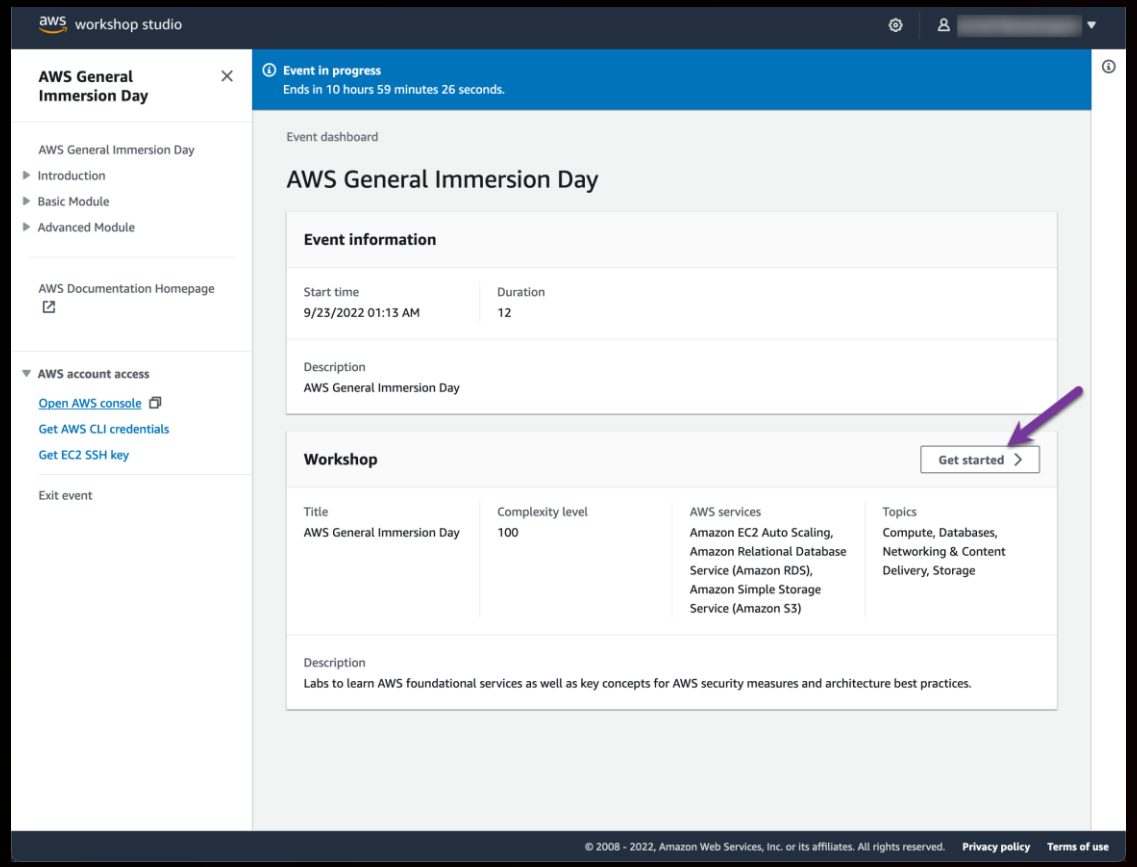
Access the AWS Console, or generate AWS CLI credentials as needed

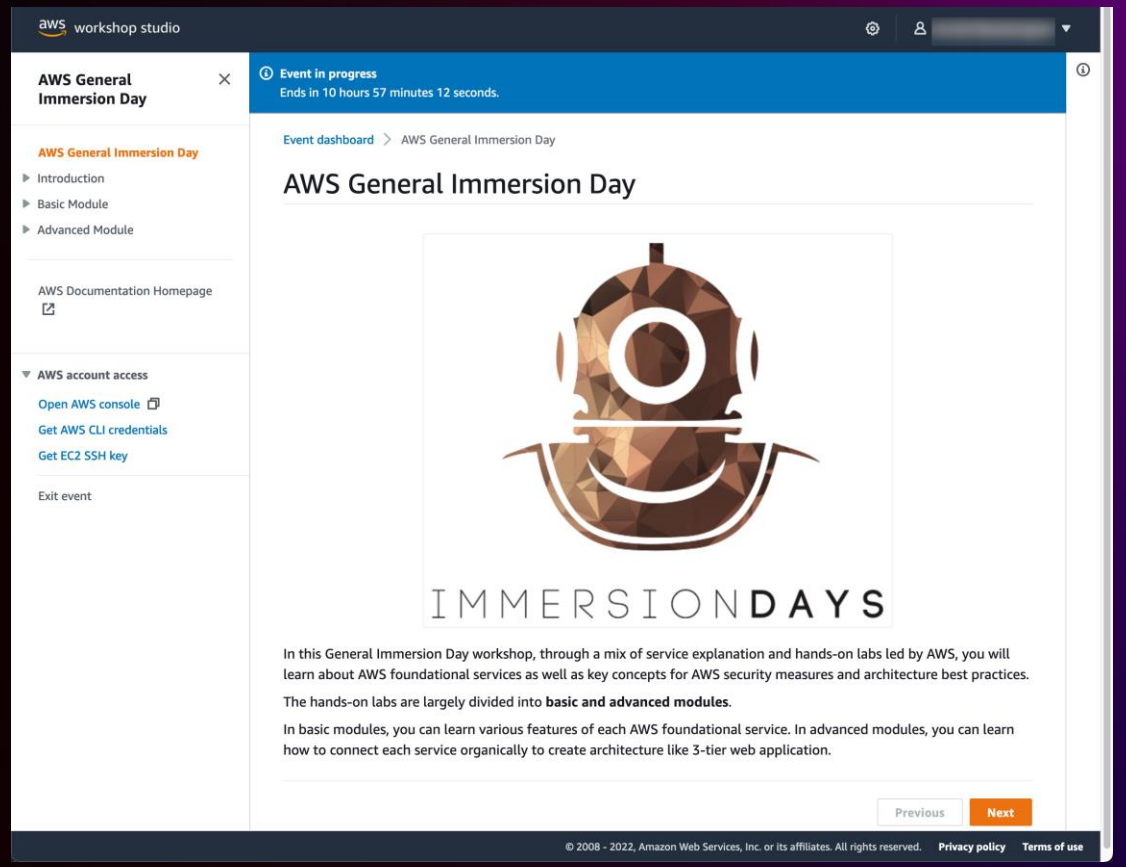



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# Step 5: Get started with the workshop

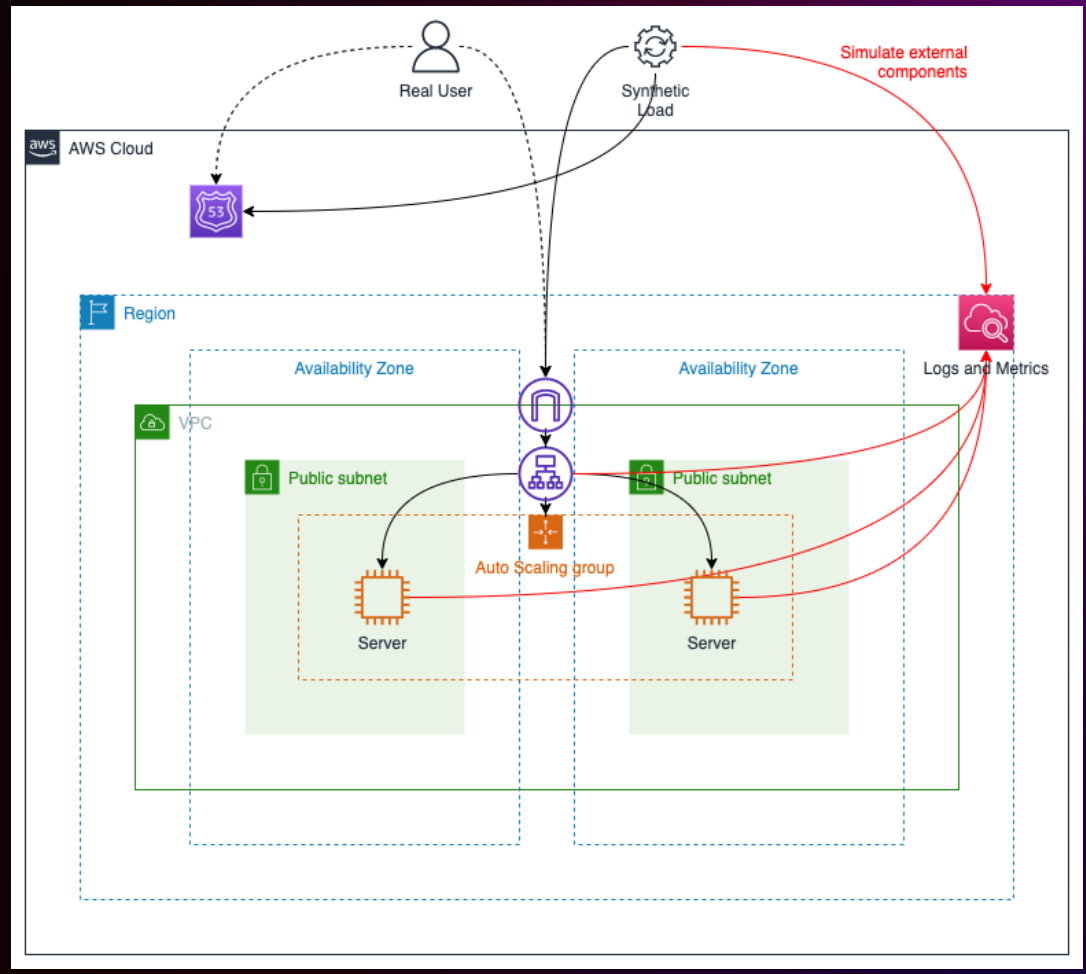



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# Step 1 – FIS experiment run

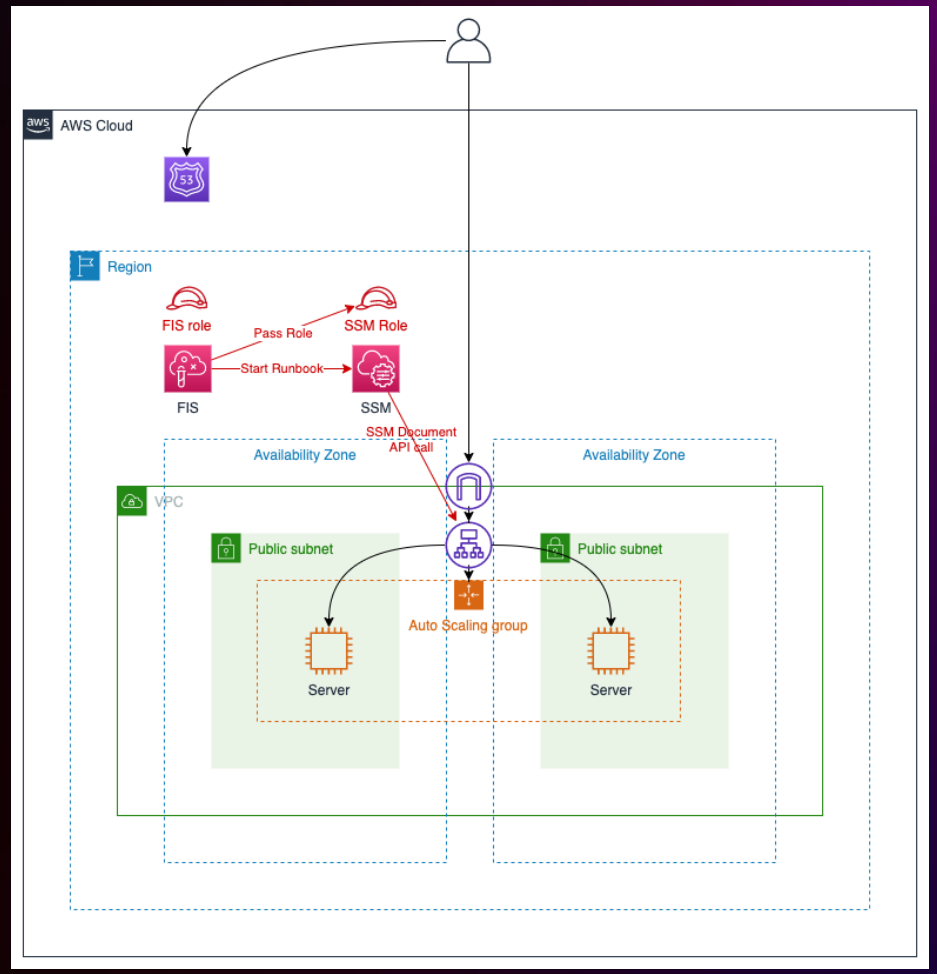
- Explore a pre-created FIS experiment
- FIS will trigger load test and impact Auto Scaling group




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# Step 2 – Systems Manager Automation execution

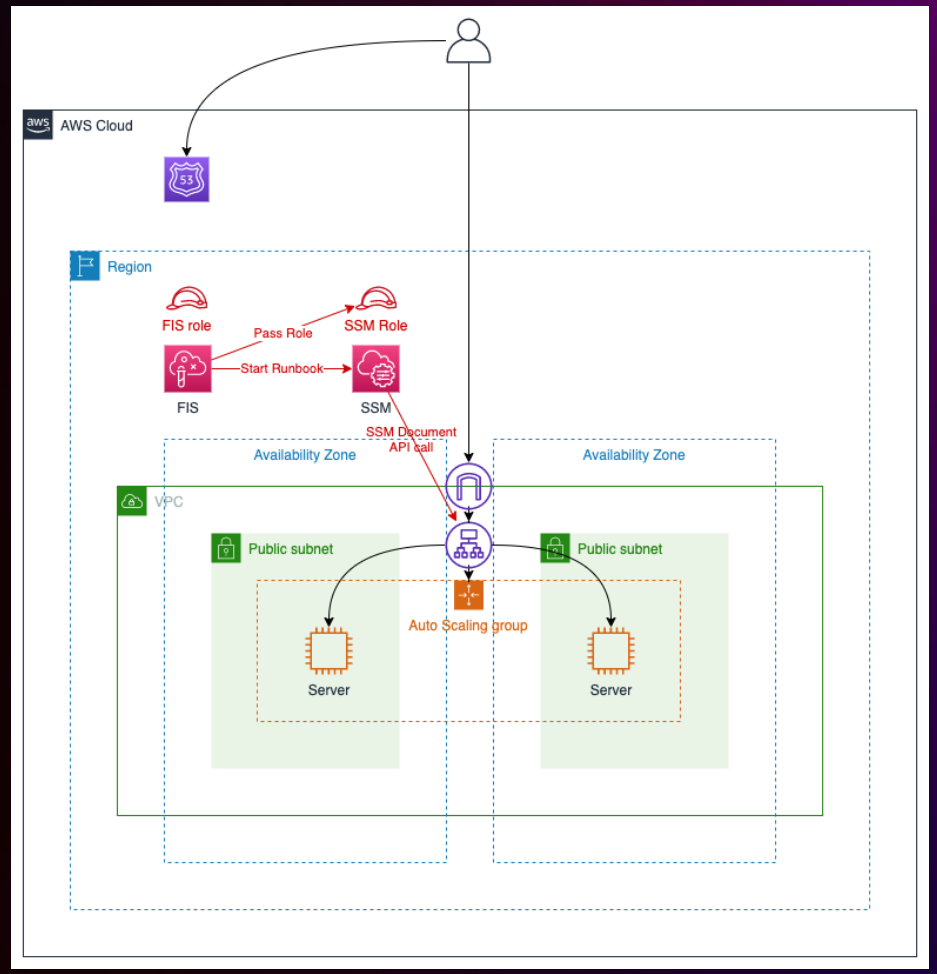
- Extend FIS functionality with Systems Manager
- Use Systems Manager to terminate instances




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# Step 3 – Availability Zone impacting actions

- Modify Systems Manager script to affect Auto Scaling group
- Modify Systems Manager script to affect NACL




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# Thank you!



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