

AWS re:Invent

NOV. 28 – DEC. 2, 2022 | LAS VEGAS, NV

From serverful to serverless Java with AWS Lambda

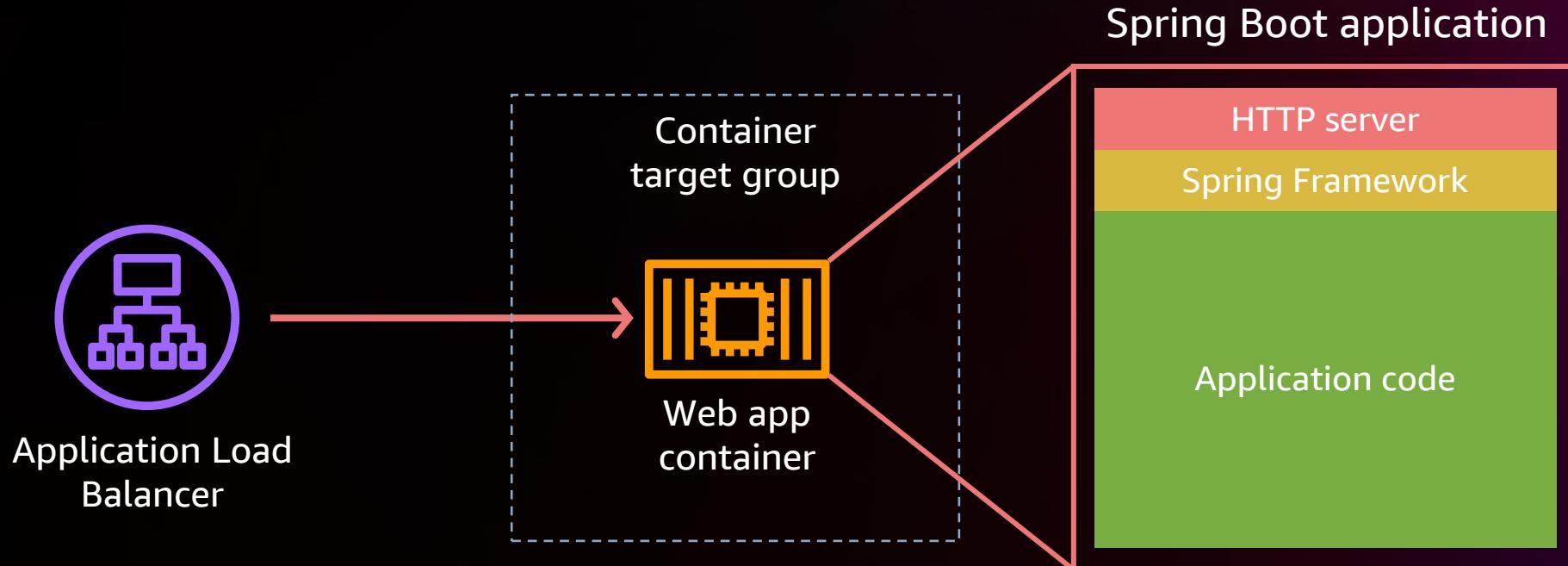
Maximilian Schellhorn

Solutions Architect
AWS

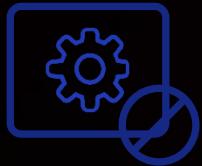
Mark Sails

Sr. Specialist Solutions Architect
AWS

Serverful Spring Boot overview



What is serverless?

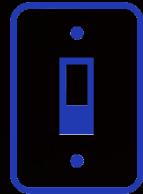


No infrastructure provisioning,
no management



Automatic scaling

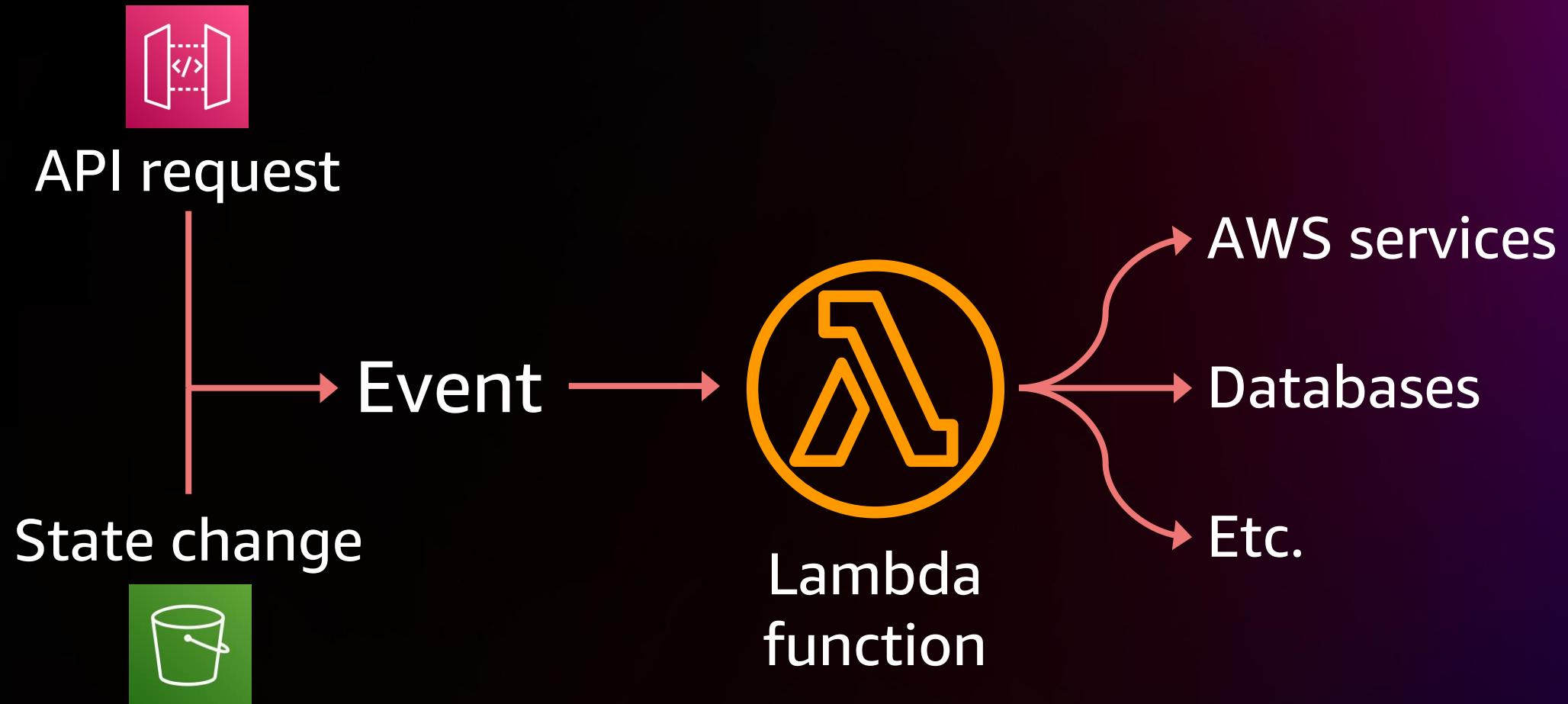
Pay for value



Highly available and secure



AWS Lambda is triggered by events



API Gateway invokes Lambda via events

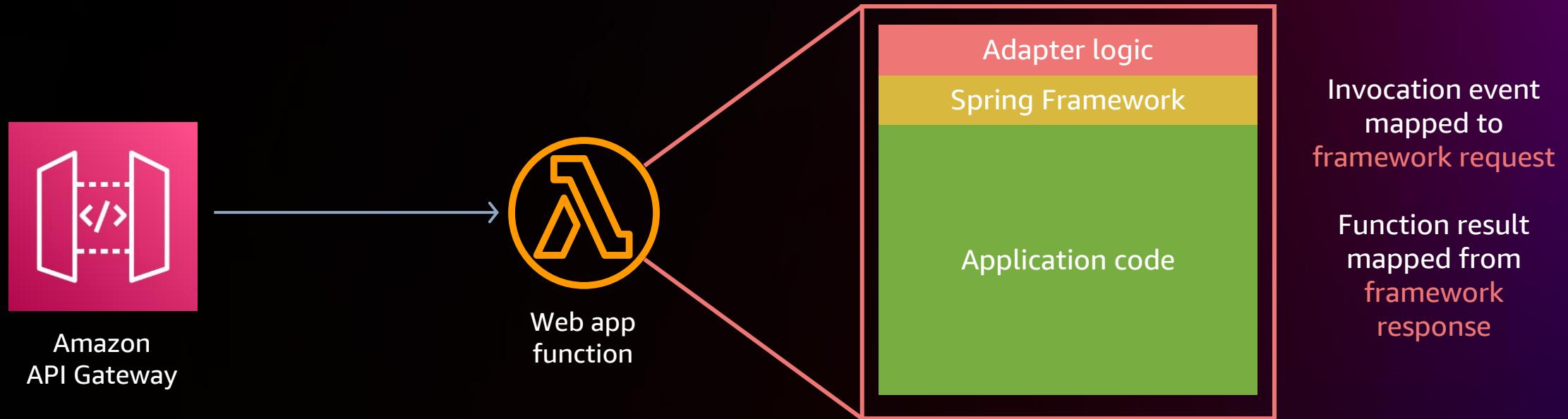
```
POST /v1/pets HTTP/2
Host: x.execute-api.eu-west-1..
User-Agent: curl/7.64.1
Accept: */*
Content-Type: application/json
Content-Length: 39
Body: {"data": "test"}
```



```
{
  "body": "{\"data\": \"test\"}",
  "resource": "/{proxy+}",
  "path": "/v1/pets",
  "httpMethod": "POST",
  "isBase64Encoded": true,
  "headers": {
    "Content-Type": "application/json",
    "Content-Length": "39"
  },
  "requestContext": {
    "accountId": "123456789012",
    "requestId": "c6af9ac6-7b61-..",
    ...
  }
}
```

Serverless Spring Boot overview

Web application wrapped in adapter logic. HTTP server removed.



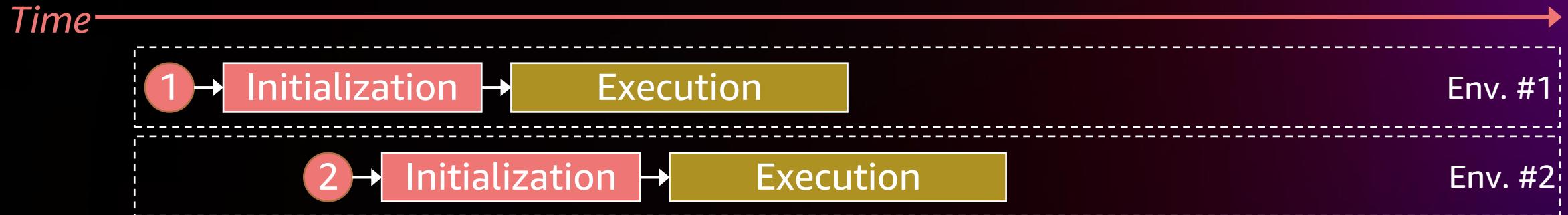
How Lambda scales: A primer on Lambda concurrency



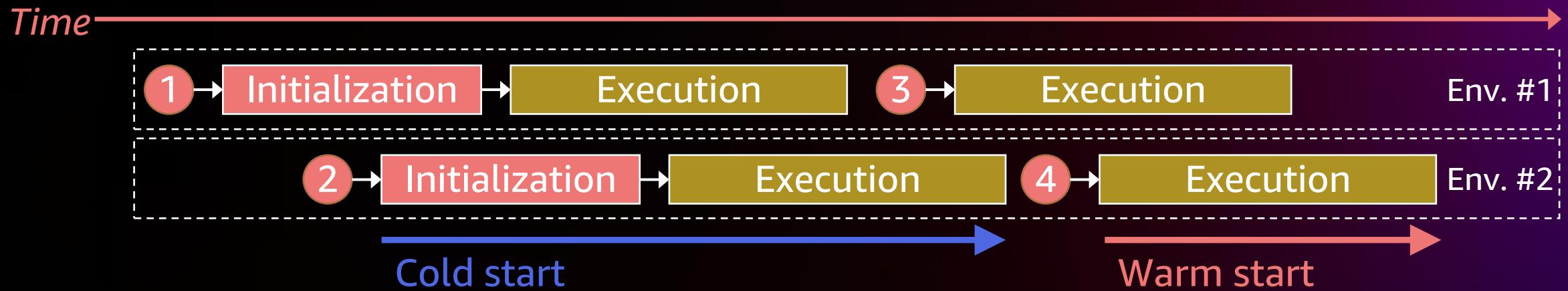
How Lambda scales: A primer on Lambda concurrency



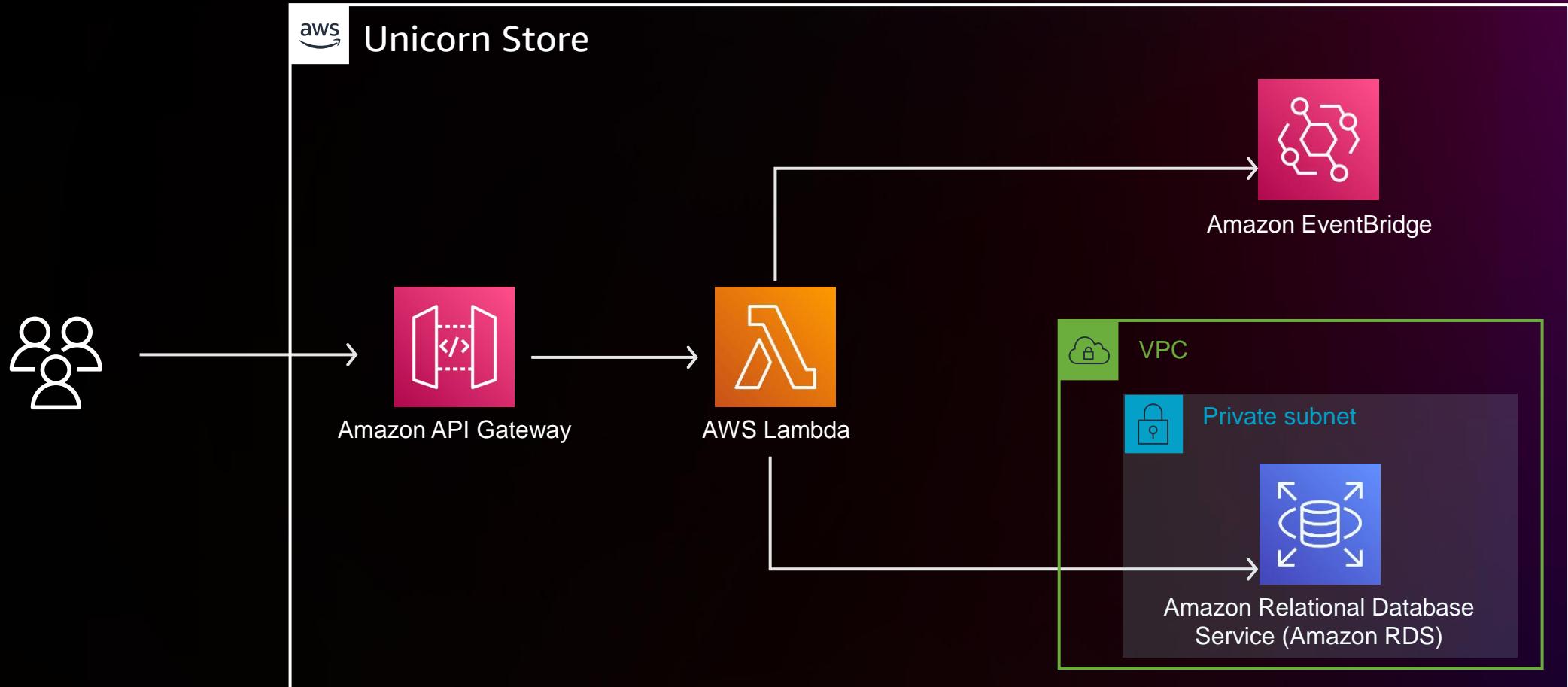
How Lambda scales: A primer on Lambda concurrency



How Lambda scales: A primer on Lambda concurrency



What are you going to build?



What are we going to optimize?

Memory configuration

JVM parameters

Lightweight dependencies

Spring Cloud Functions

Micronaut

GraalVM Native Image



AWS Cloud Development Kit (AWS CDK)



AWS CDK

```
var restApi = LambdaRestApi.Builder.create(this, "UnicornStoreBasicApi")
    .restApiName("UnicornStoreBasicApi")
    .handler(postLambda)
    .proxy(false)
    .build();

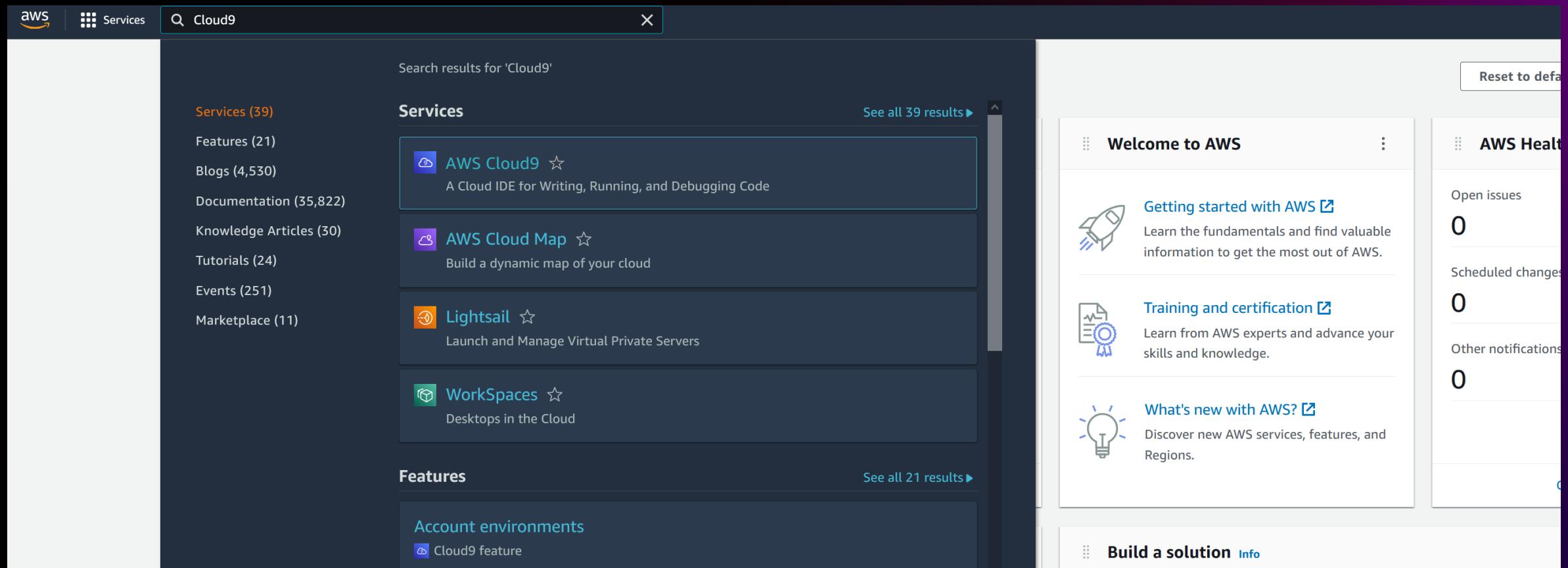
Resource unicornResource = restApi.getRoot().addResource("unicorns");
unicornResource.addMethod("POST", new LambdaIntegration(postLambda));

Resource unicornResourceById = unicornResource.addResource("{id}");
unicornResourceById.addMethod("GET", new LambdaIntegration(getLambda));
unicornResourceById.addMethod("PUT", new LambdaIntegration(putLambda));
unicornResourceById.addMethod("DELETE", new LambdaIntegration(deleteLambda));
```

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.

Our IDE today: AWS Cloud9



The screenshot shows the AWS search interface with the query 'Cloud9'. The results are categorized into 'Services' and 'Features'.

Services (39)

- AWS Cloud9 ☆
A Cloud IDE for Writing, Running, and Debugging Code
- AWS Cloud Map ☆
Build a dynamic map of your cloud
- Lightsail ☆
Launch and Manage Virtual Private Servers
- WorkSpaces ☆
Desktops in the Cloud

Features (21)

- Account environments

Services

See all 39 results ►

Welcome to AWS

- Getting started with AWS** ↗
Learn the fundamentals and find valuable information to get the most out of AWS.
- Training and certification** ↗
Learn from AWS experts and advance your skills and knowledge.
- What's new with AWS?** ↗
Discover new AWS services, features, and Regions.

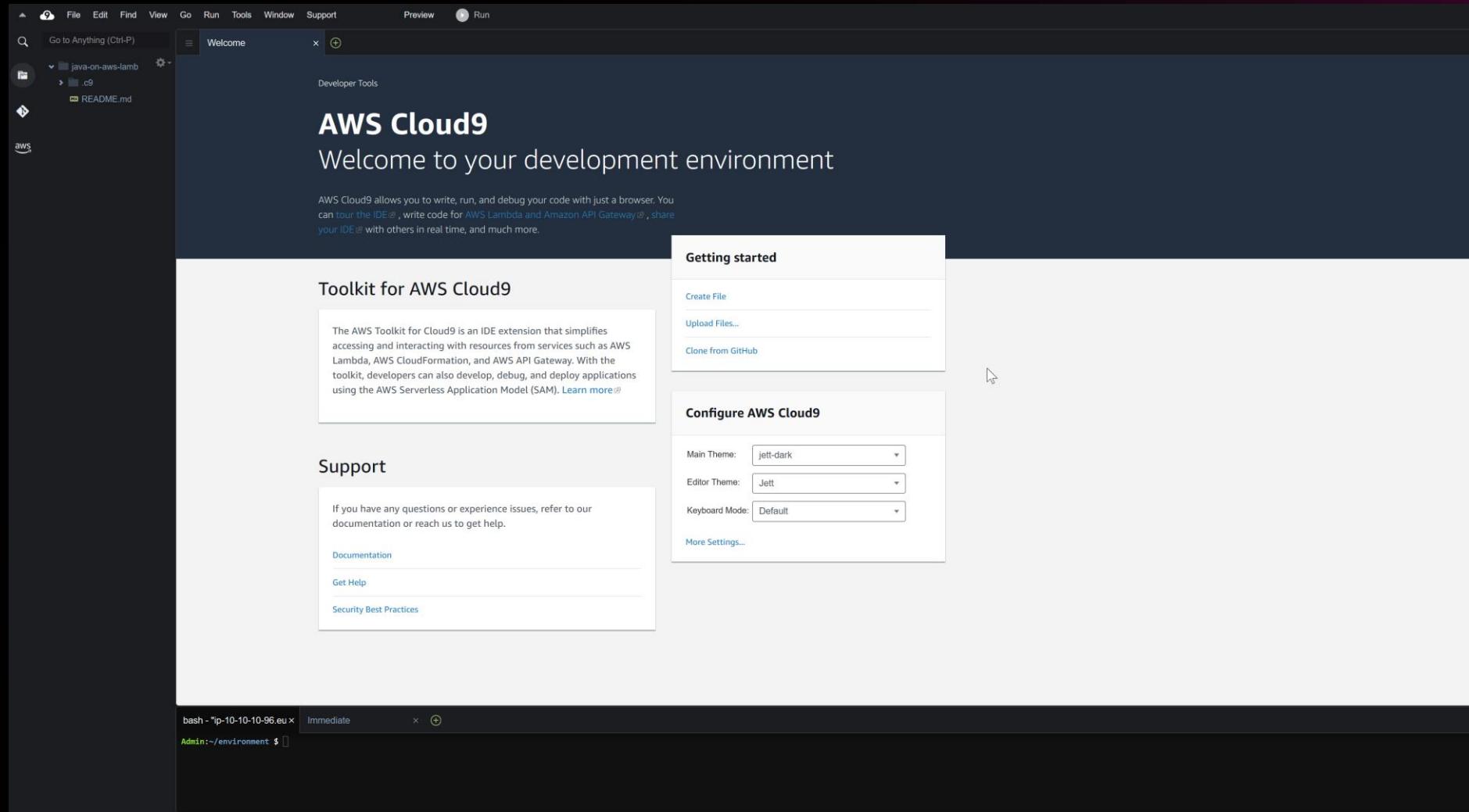
Build a solution Info

AWS Health

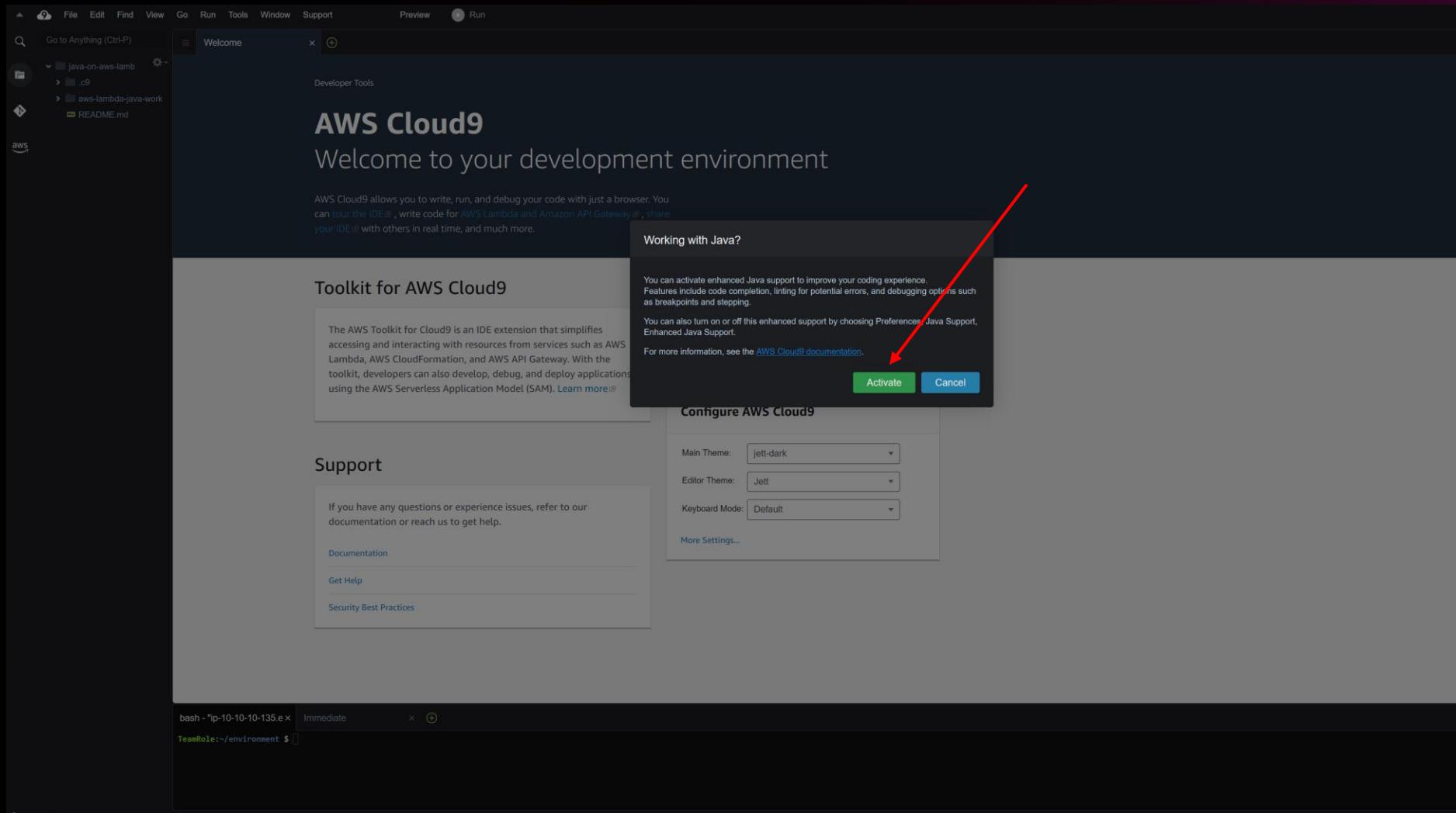
- Open issues **0**
- Scheduled changes **0**
- Other notifications **0**

Reset to default

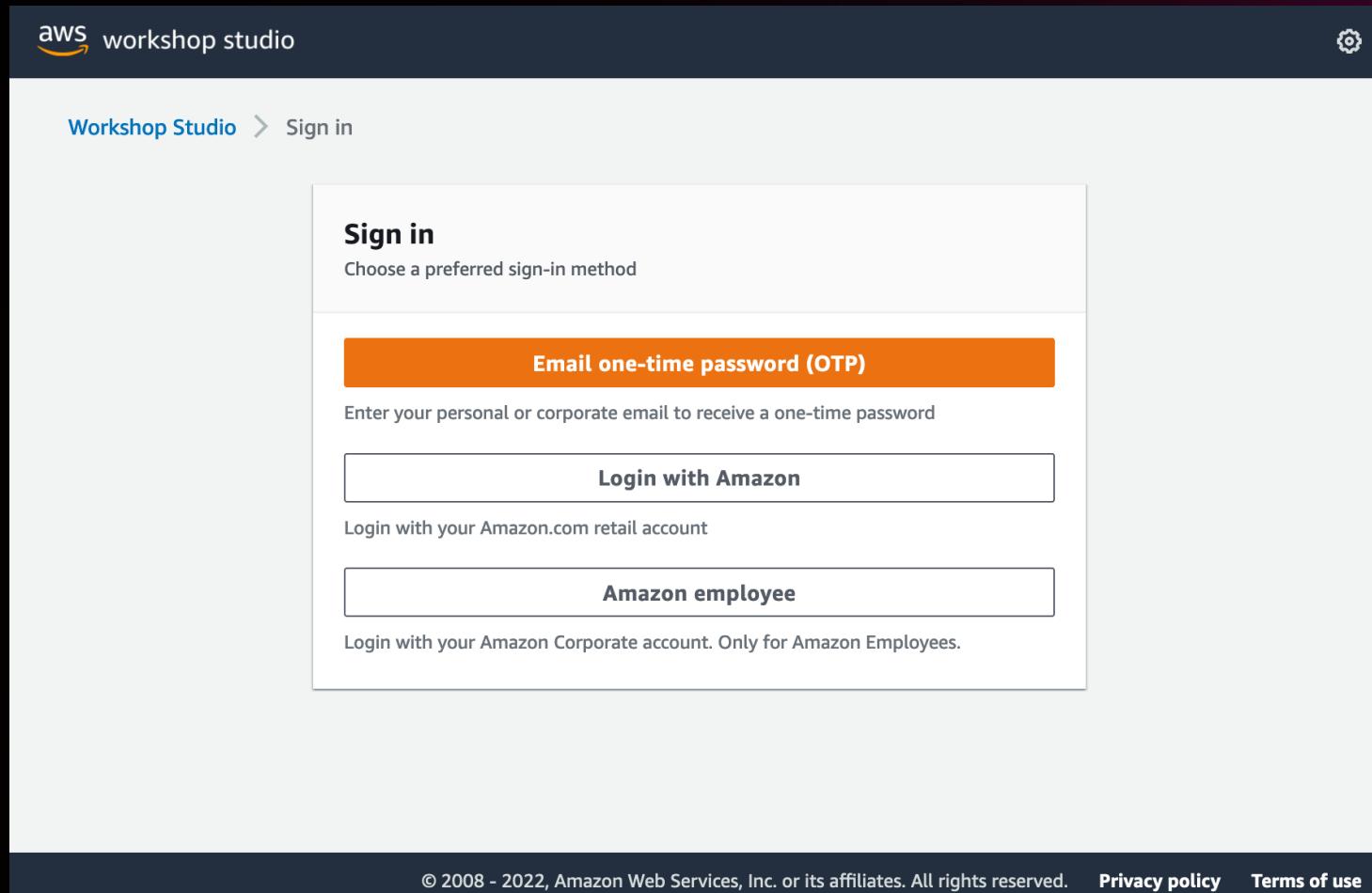
Our IDE today: AWS Cloud9



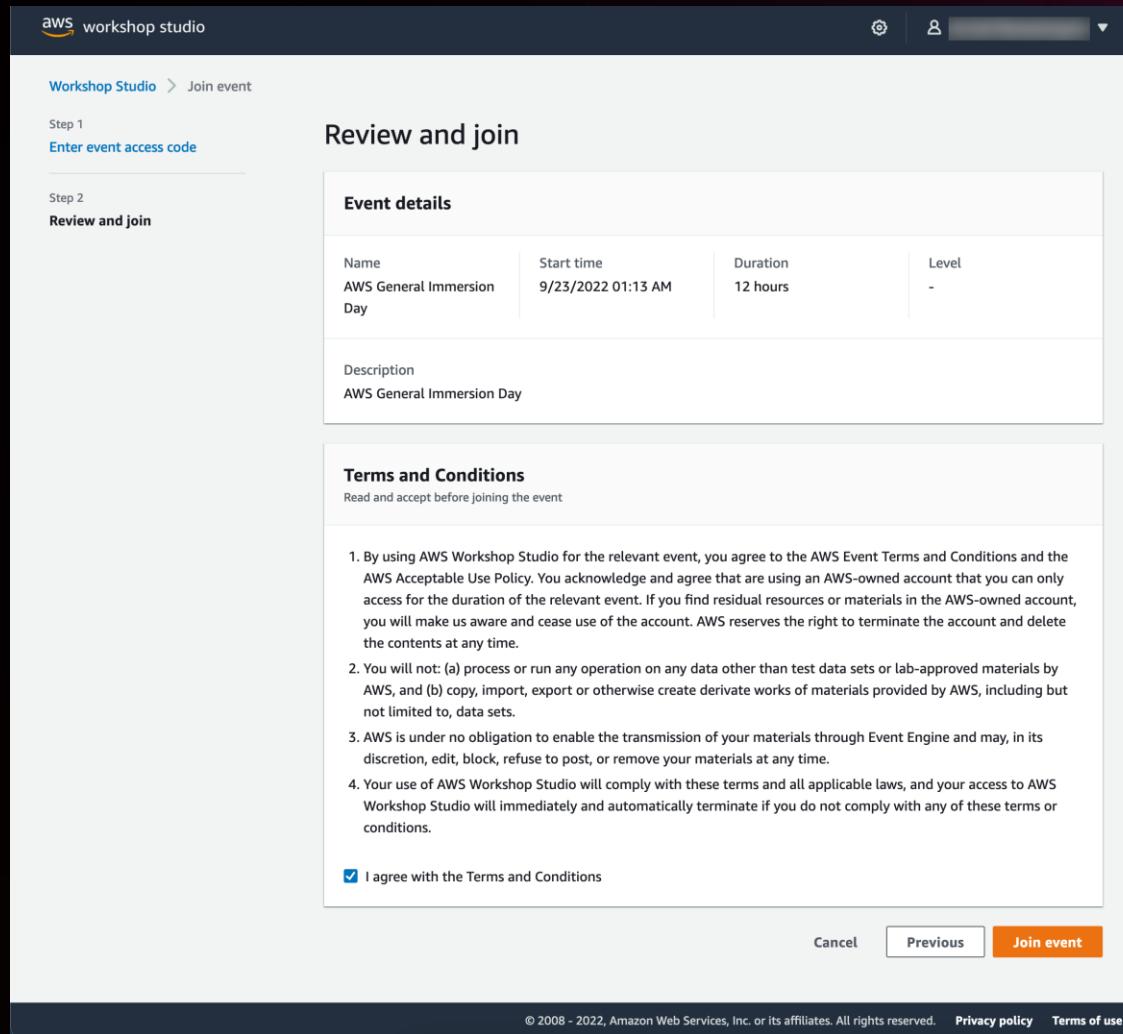
Our IDE today: AWS Cloud9



Step 1: Sign in with your preferred method



Step 2: Review terms and join event



The screenshot shows the 'Review and join' step of the AWS Workshop Studio 'Join event' process. The interface is divided into two main sections: 'Event details' and 'Terms and Conditions'.

Event details

Name	Start time	Duration	Level
AWS General Immersion Day	9/23/2022 01:13 AM	12 hours	-

Description
AWS General Immersion Day

Terms and Conditions
Read and accept before joining the event

1. By using AWS Workshop Studio 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 derivative 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 Event Engine and may, in its discretion, edit, block, refuse to post, or remove your materials at any time.
4. Your use of AWS Workshop Studio will comply with these terms and all applicable laws, and your access to AWS Workshop Studio will immediately and automatically terminate if you do not comply with any of these terms or conditions.

I agree with the Terms and Conditions

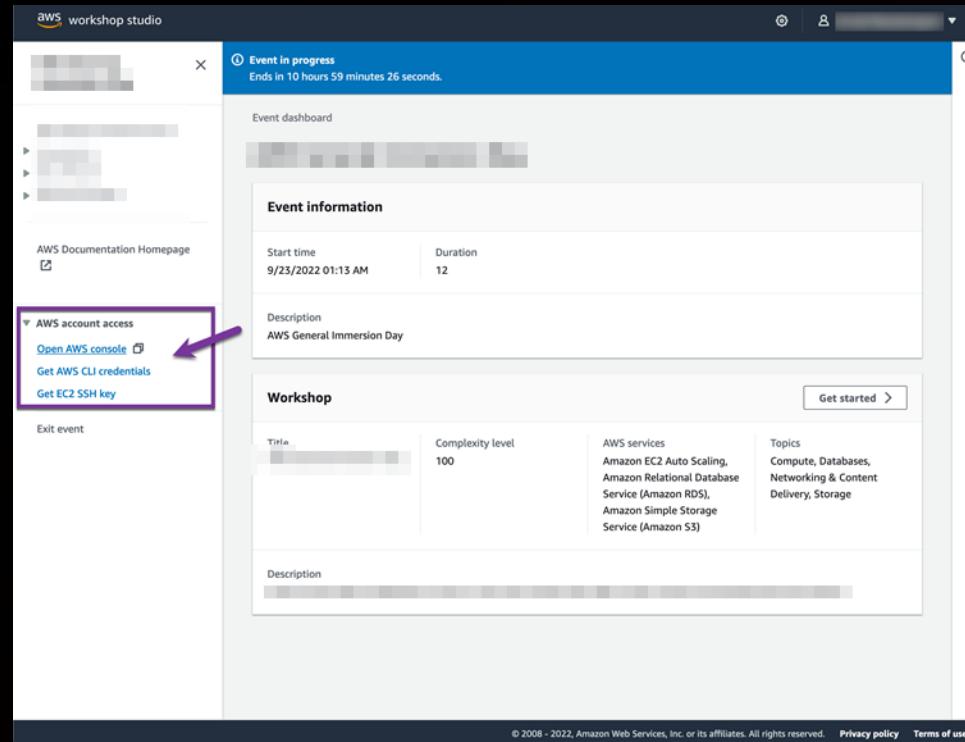
Cancel Previous **Join event**

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Step 3: Access AWS account

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



AWS workshop studio

Event in progress
Ends in 10 hours 59 minutes 26 seconds.

Event dashboard

AWS Documentation Homepage

AWS account access

- Open AWS console
- Get AWS CLI credentials
- Get EC2 SSH key

Workshop

Start time: 9/23/2022 01:15 AM Duration: 12

Description: AWS General Immersion Day

Get started >

Complexity level: 100

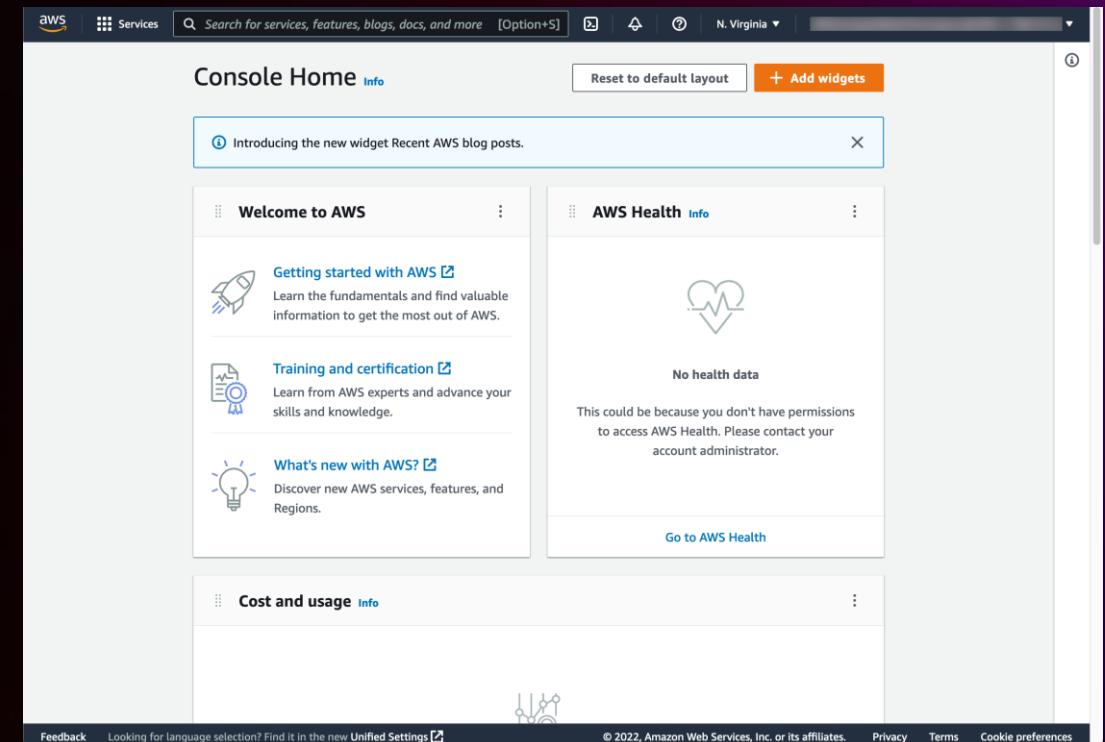
AWS services: Amazon EC2 Auto Scaling, Amazon Relational Database Service (Amazon RDS), Amazon Simple Storage Service (Amazon S3)

Topics: Compute, Databases, Networking & Content Delivery, Storage

Description: [redacted]

Exit event

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aws

Services

Search for services, features, blogs, docs, and more [Option+S]

Console Home [Info](#)

Introducing the new widget Recent AWS blog posts.

Reset to default layout + Add widgets

Welcome to AWS

Getting started with AWS [Info](#)
Learn the fundamentals and find valuable information to get the most out of AWS.

Training and certification [Info](#)
Learn from AWS experts and advance your skills and knowledge.

What's new with AWS? [Info](#)
Discover new AWS services, features, and Regions.

AWS Health [Info](#)

No health data

This could be because you don't have permissions to access AWS Health. Please contact your account administrator.

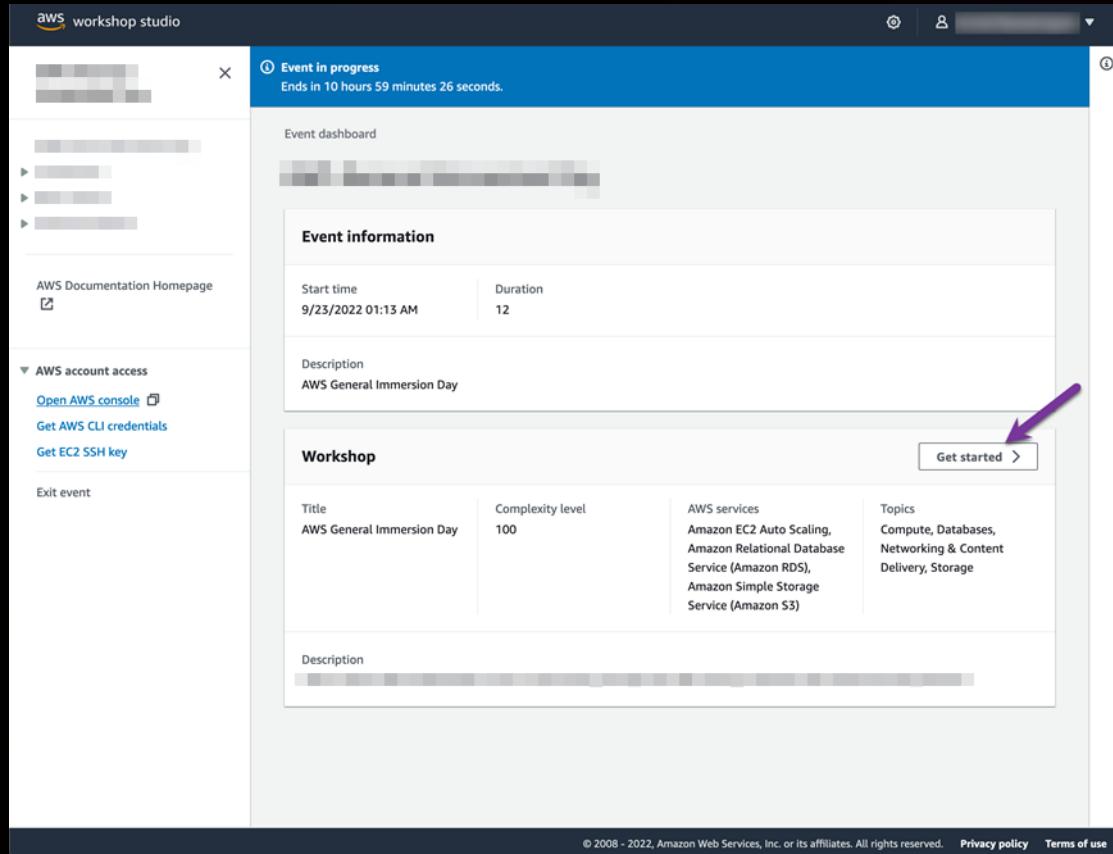
Go to AWS Health

Cost and usage [Info](#)

Feedback Looking for language selection? Find it in the new Unified Settings [Info](#)

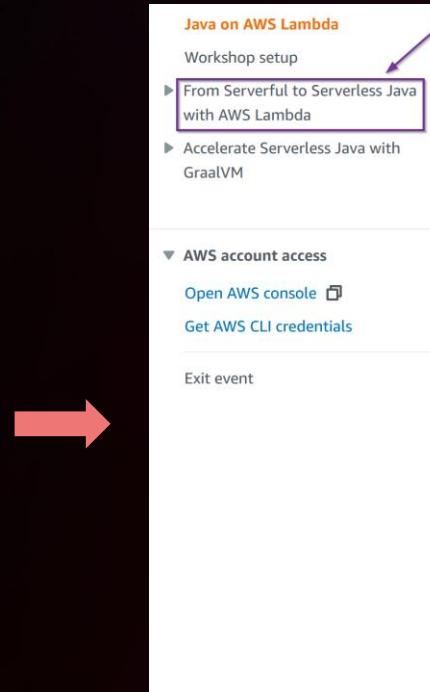
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Step 4: Get started with the workshop



The screenshot shows the AWS workshop studio interface. At the top, it says "Event in progress" with a duration of "10 hours 59 minutes 26 seconds". Below that is the "Event dashboard" section. In the "Workshop" section, there is a "Get started >" button, which is highlighted with a purple arrow. The "Workshop" section also displays the following details:

Title	Complexity level	AWS services	Topics
AWS General Immersion Day	100	Amazon EC2 Auto Scaling, Amazon Relational Database Service (Amazon RDS), Amazon Simple Storage Service (Amazon S3)	Compute, Databases, Networking & Content Delivery, Storage



The screenshot shows the "Java on AWS Lambda" workshop setup page. The "From Serverful to Serverless Java with AWS Lambda" link is highlighted with a purple box and a purple arrow. The page also includes the following sections:

- Workshop setup
 - From Serverful to Serverless Java with AWS Lambda
 - Accelerate Serverless Java with GraalVM
- AWS account access
 - Open AWS console
 - Get AWS CLI credentials
- Exit event

Event dashboard > Java on AWS Lambda

Java on AWS Lambda

Welcome Builders!

The Java programming language has adapted to a changing technology landscape, enabling the creation of more sustainable software architectures and applications. The combination of Java and AWS Lambda allows you to build serverless applications using Java.

The introduction of [AWS Lambda](#) has changed the desired characteristics of serverless applications. Because the Lambda environment only processes a single invocation at a time, the lifetime of a function is much shorter than a traditional application. The start-up time of an application and the memory footprint is critical.

The Java ecosystem is adapting and introduced several new projects to support serverless Java. The introduction of GraalVM and the Java Native Image tool have reduced the memory footprint and peak performance by introducing a concept of native images. This means that the Java release cycle mean that innovation will be delivered faster. Open source projects like GraalVM and Java Native Image are great examples of how Java is evolving to support serverless applications.

Learning Objectives

In this workshop you will learn how to build cloud-native Java applications using AWS Lambda. You will learn how to migrate your existing Java application to AWS Lambda. This workshop will also cover the following topics:



Help and hints

2. Navigate to the UnicornPostLocationHandler and define the logger according to the SLF4J API specification:

```
1 private final Logger logger = LoggerFactory.getLogger(UnicornPostLocationHandler.class);
```



Imports

```
1 import org.slf4j.Logger;  
2 import org.slf4j.LoggerFactory
```

1. Run the benchmark

1. Execute the following command to run the benchmark:

```
1 ./benchmark.sh spring
```



Under the hood

The shell script executes the Artillery load test defined in `loadtest.yaml`. As a target it uses the API-Gateway Url that has been generated after the deployment.

```
1 artillery run -t $(cat infrastructure/cdk/output-basic.json | jq -r '.UnicornStoreBasicApp.apibasicendpoint') -v
```



Let's get started!

<https://s12d.com/reinvent22-SVS310>



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Resources and examples

<https://serverlessland.com/reinvent2022/svs310>

Related sessions

SVS307: Easily add observability with AWS Lambda Powertools for Java

Wednesday, 30. November 1:00 PM – 2:00 PM

Level 1, Academy 417, Caesars Forum

SVS403: Effectively using Java on Serverless

Thursday, 1. December 3:30 PM – 4:30 PM

Convention Promenade, Palmer 2, Wynn

Thank you!

Maximilian Schellhorn

 @maschnetwork

Mark Sails

 @MarkSails3



Please complete the session
survey in the **mobile app**



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